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Kim et al.

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(54) AIR CONDITIONER INCLUDING A HANDLE AND METHOD OF CONTROLLING THE SAME

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(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 709 days.

(21) Appl. No.: **14/660,016**

(22) Filed: **Mar. 17, 2015**

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(30) **Foreign Application Priority Data**

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Jun. 9, 2014 (KR) 10-2014-0069740

(51) **Int. Cl.**
F24F 13/22 (2006.01)
F24F 5/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***F24F 5/001*** (2013.01); ***F24F 1/025*** (2013.01); ***F24F 11/30*** (2018.01); ***F24F 13/222*** (2013.01); *F24F 2013/225* (2013.01)

(58) **Field of Classification Search**
CPC F24F 1/025; F24F 13/222; F24F 13/224; F24F 2013/225; F24F 2013/227
See application file for complete search history.

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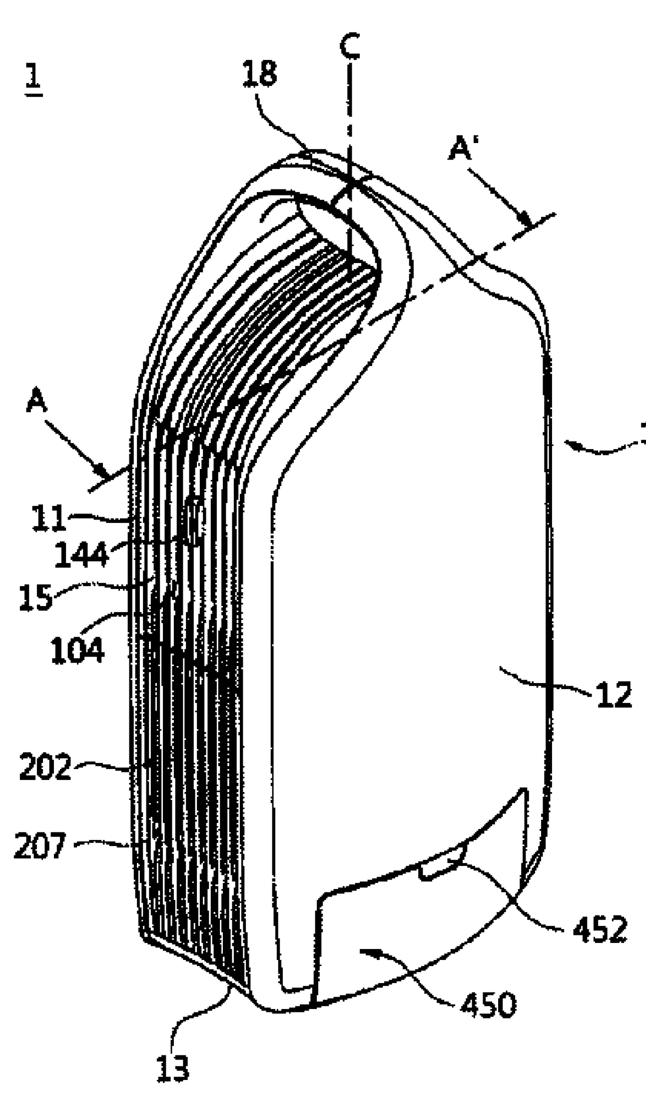
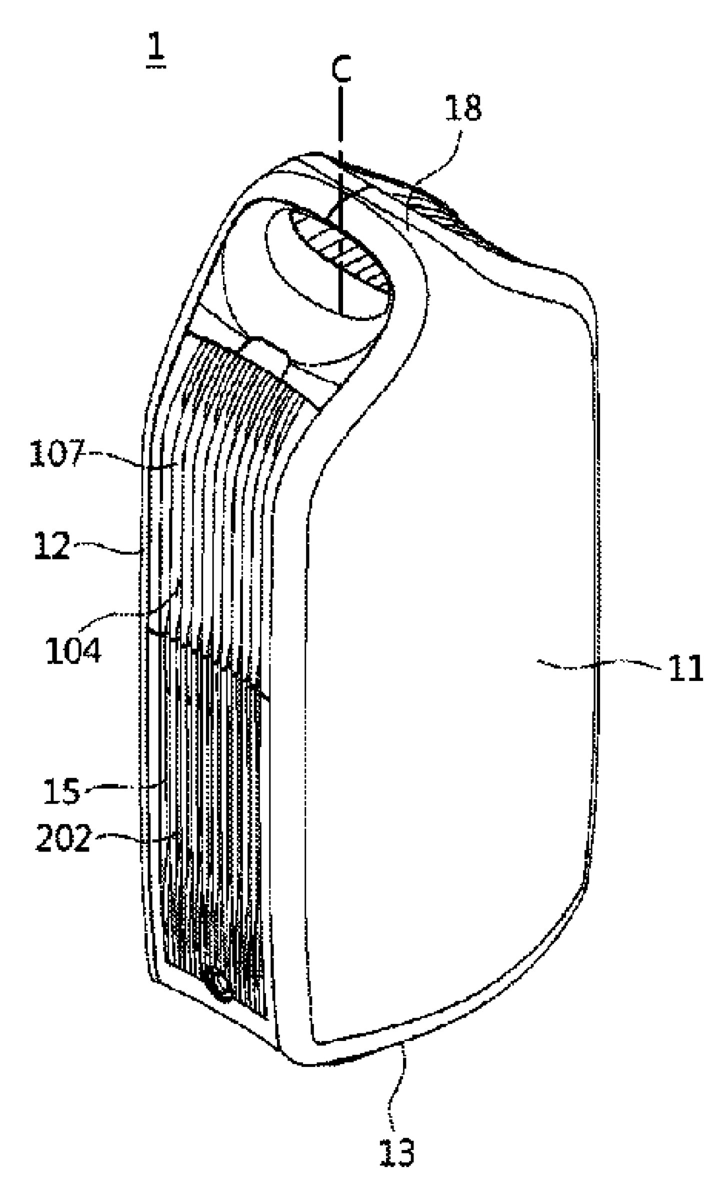
Primary Examiner — Jonathan Bradford
(74) *Attorney, Agent, or Firm* — Staas & Halsey LLP

(57) **ABSTRACT**

Disclosed herein is an air conditioner that is designed to include a first space in which an evaporator is disposed and a second space in which a condenser is disposed and which is divided from the first space. An outdoor unit and an indoor unit are integrally formed, and thus it is easy to move the air conditioner. A structure and disposition of a heat exchanger are improved, and thus heat exchange efficiency is improved. Operations of a cooling mode and a dehumidifying mode are possible.

11 Claims, 31 Drawing Sheets





(51) **Int. Cl.**
F24F 11/30 (2018.01)
F24F 1/02 (2011.01)

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FIG. 1A

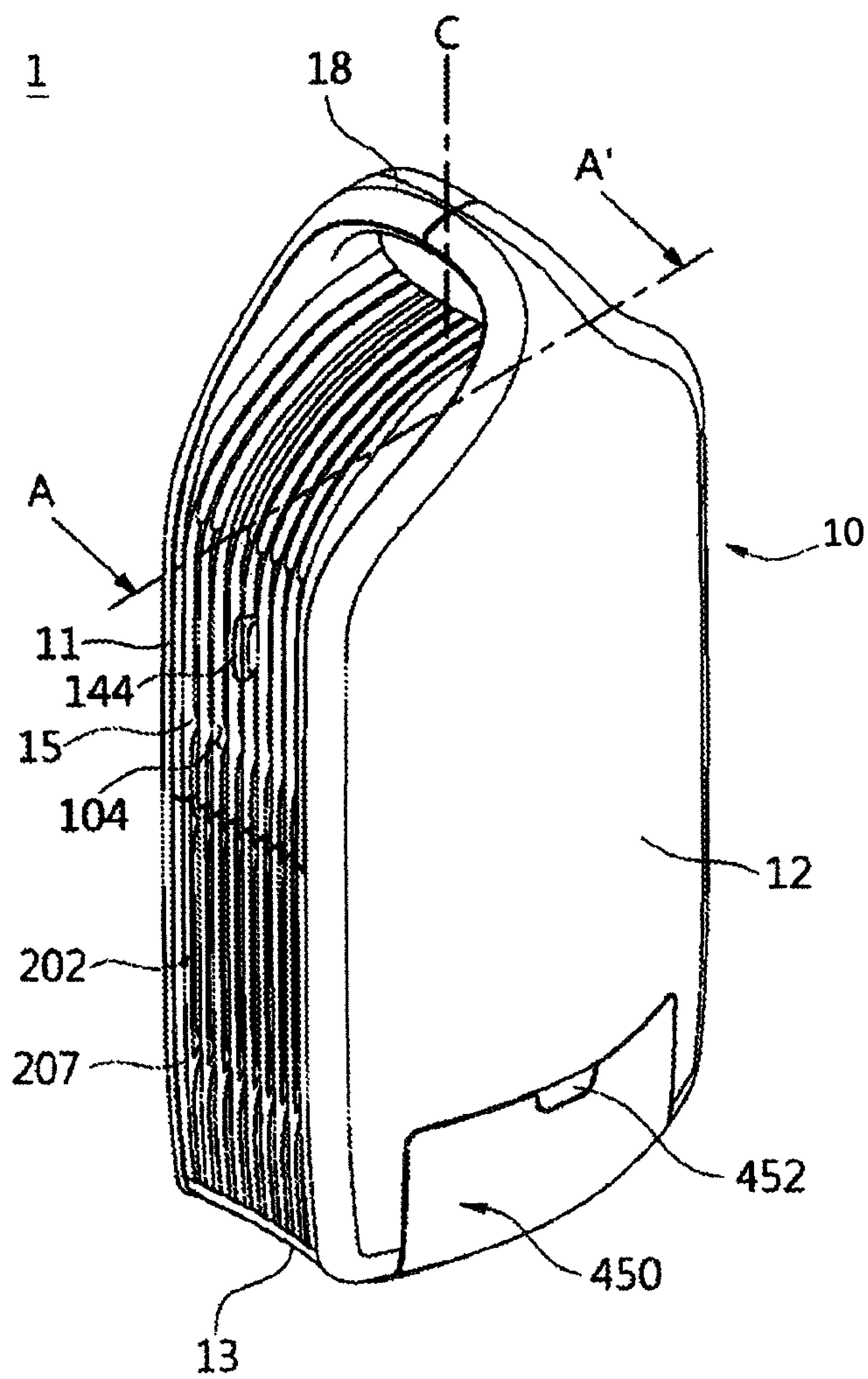


FIG. 1B

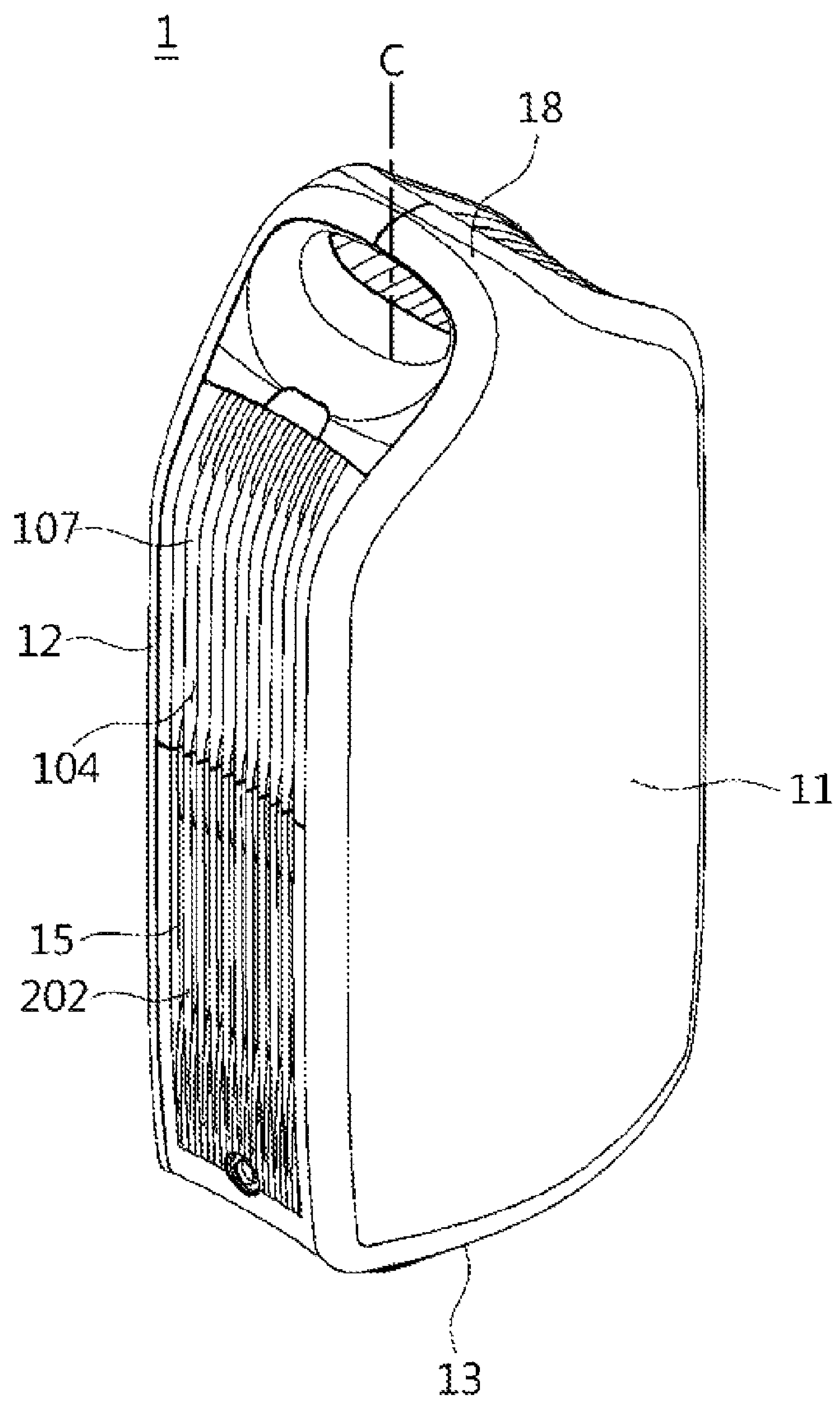
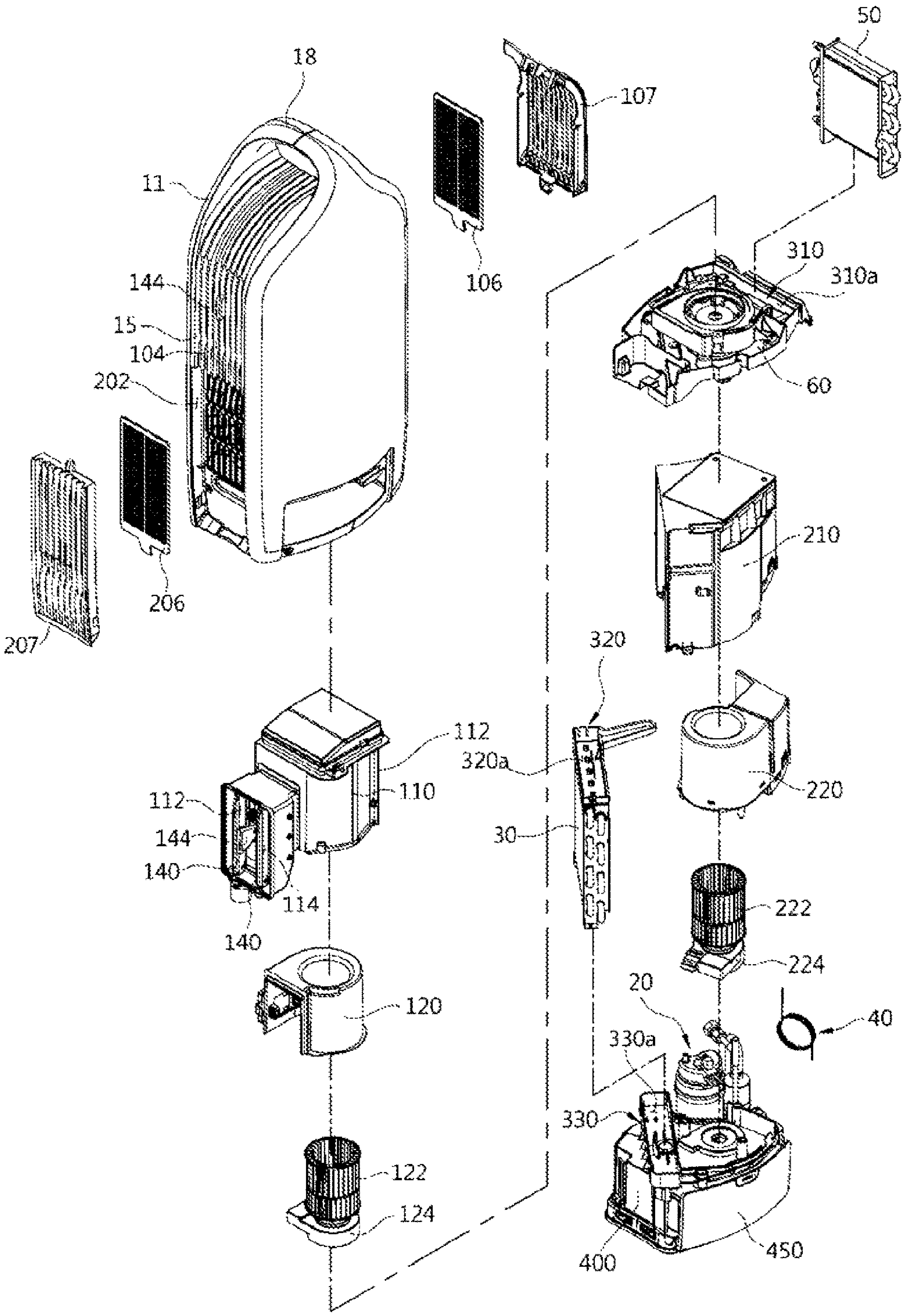
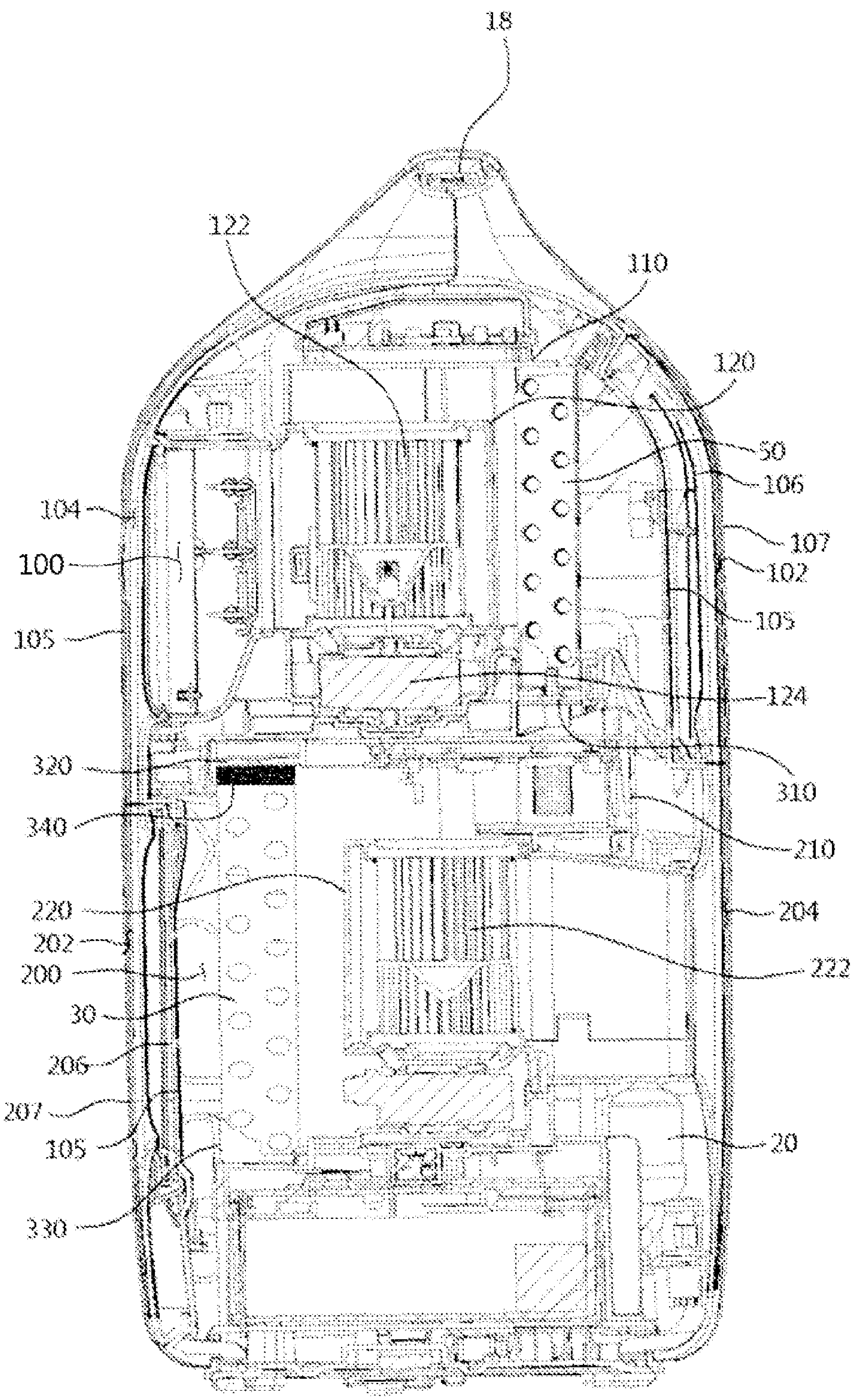


FIG. 2A



50
18
107
11
106
310
310a
144
15
104
60
202
210
206
207
320
112
320a
110
220
112
144
30
140
114
222
140
224
20
120
40
330a
330
122
124
450
400

FIG. 2B


18
122
110
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50
106
107
102
105
104
100
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124
320
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340
210
220
204
202
200
222
30
206
207
105
20
330

FIG. 3

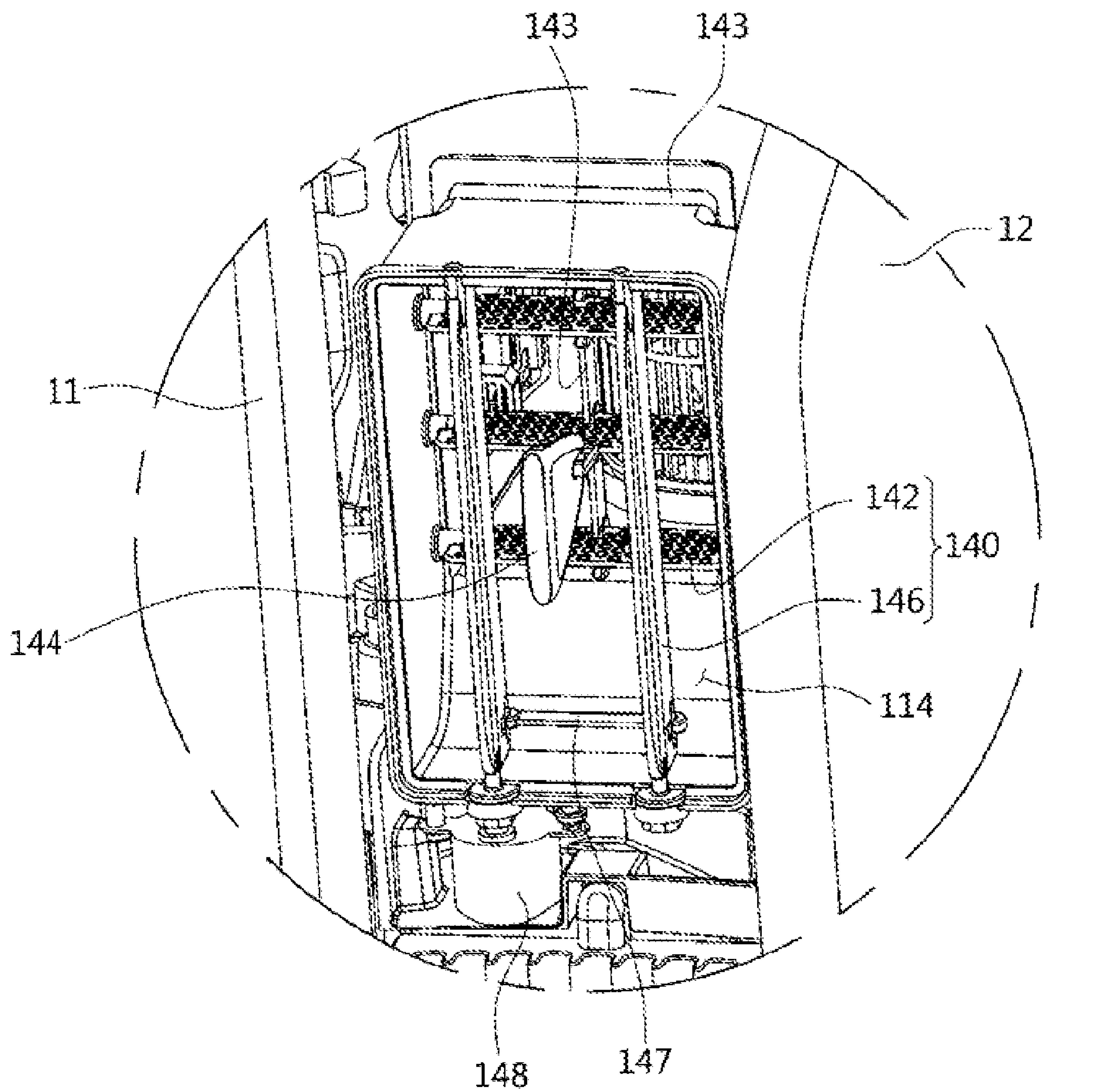


FIG. 4

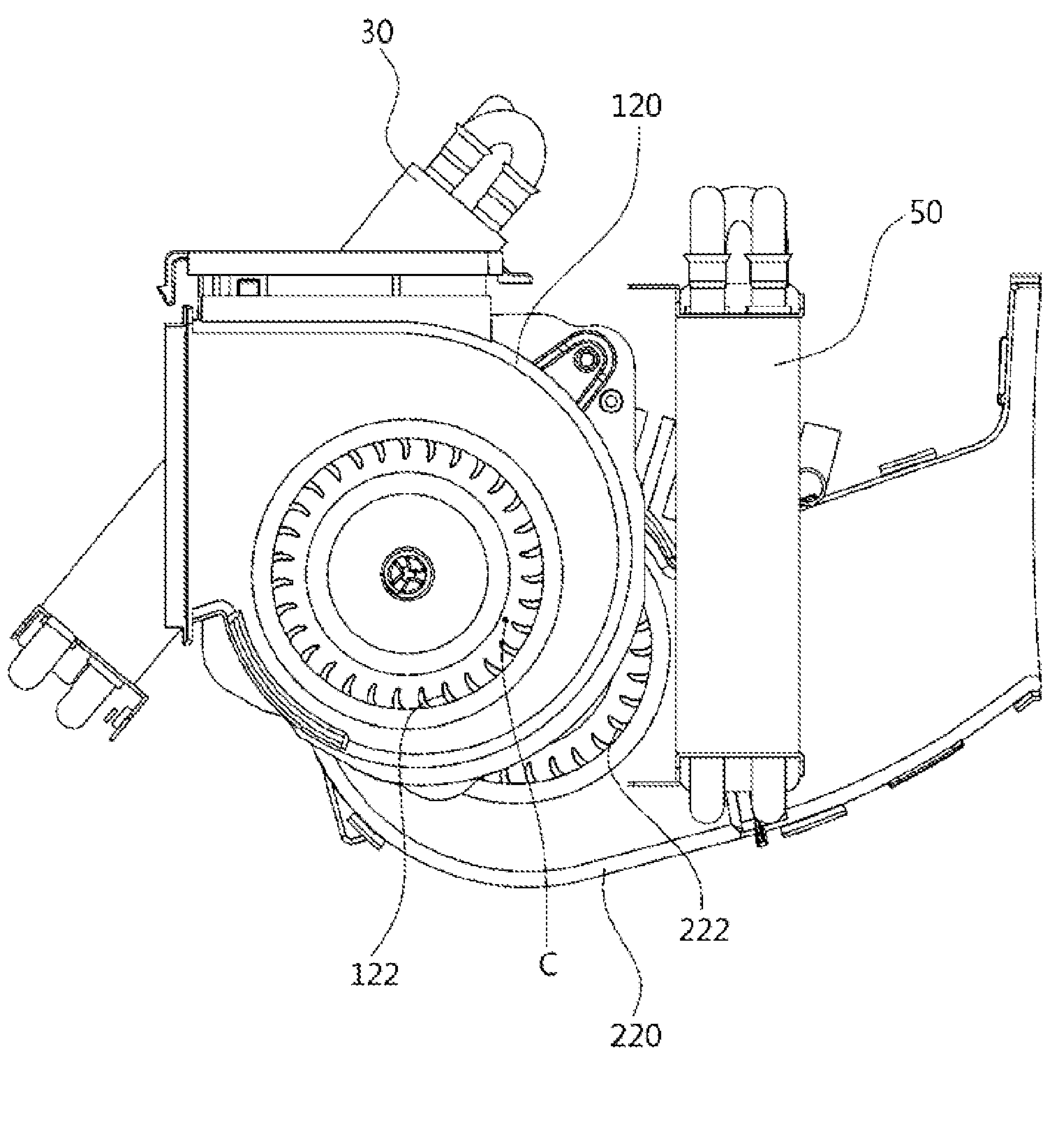


FIG. 5

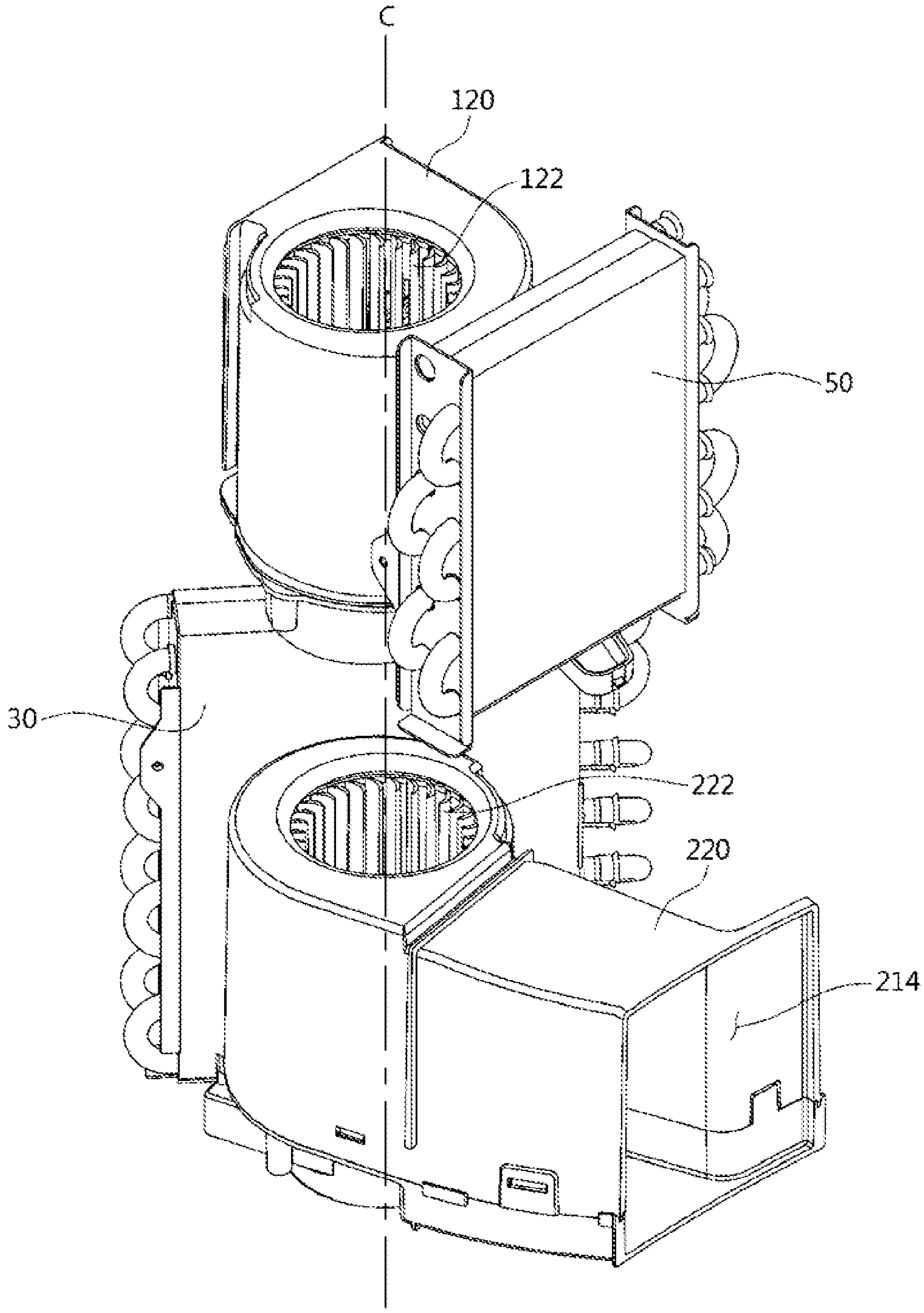


FIG. 6

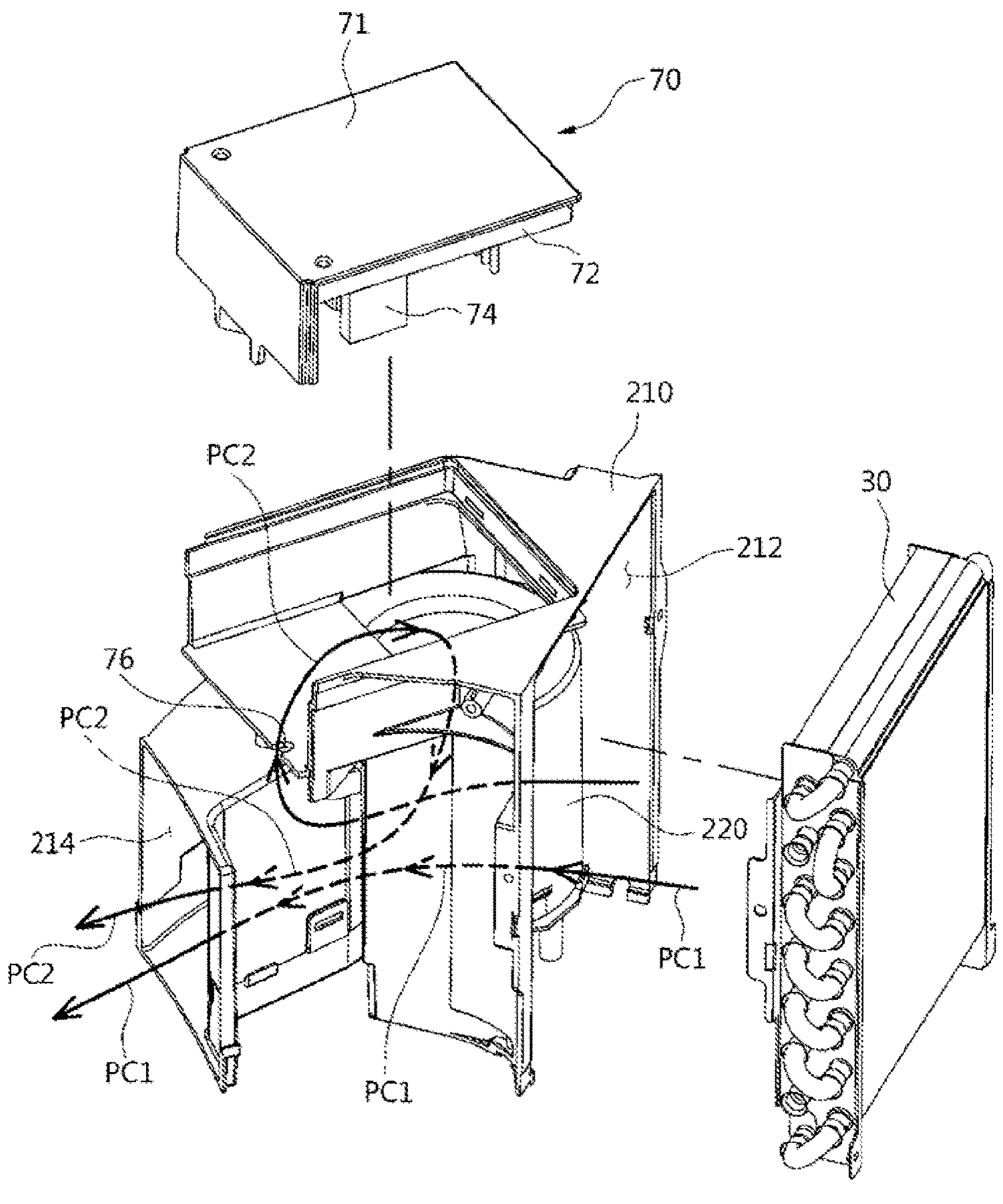


FIG. 7

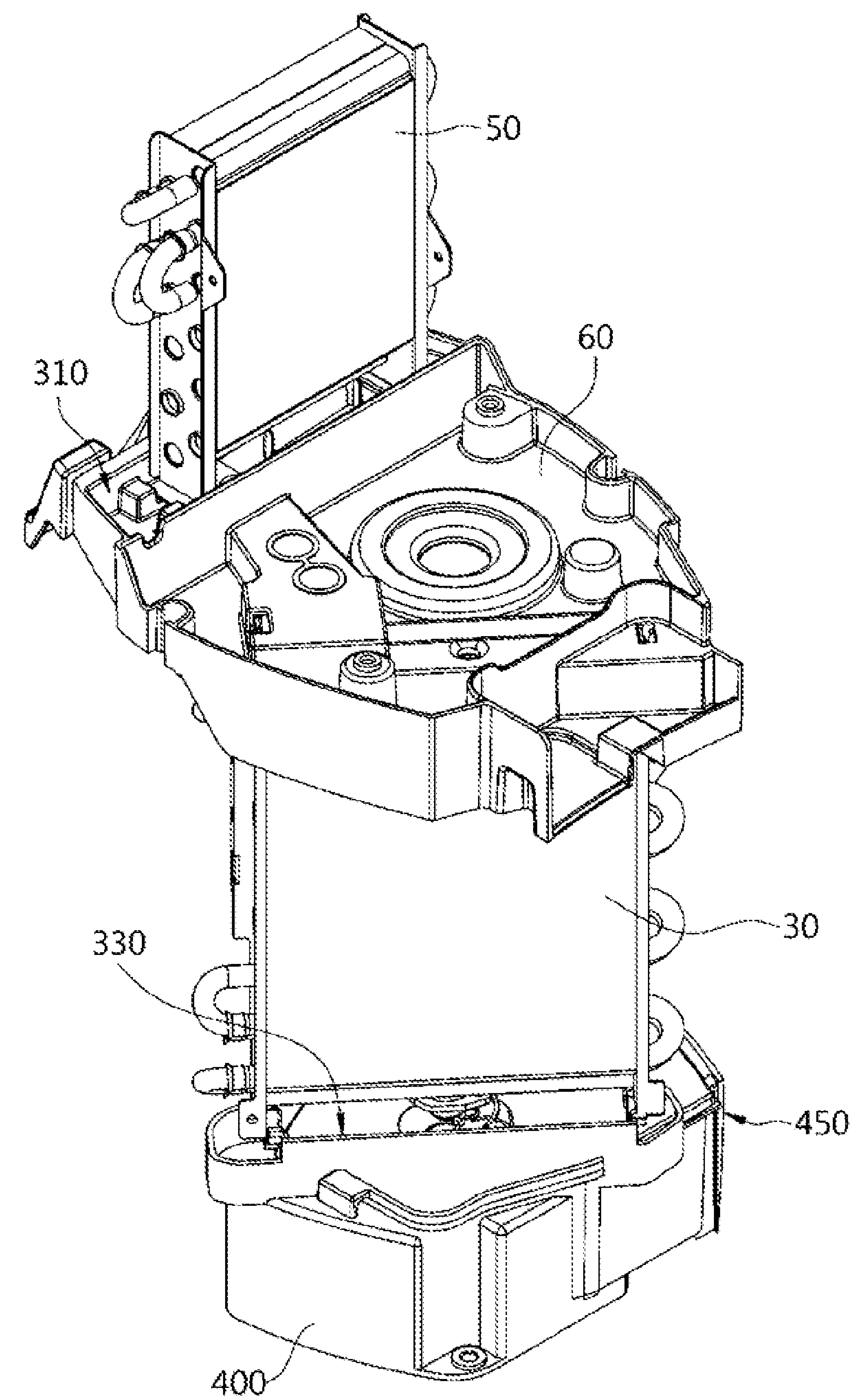


FIG. 8

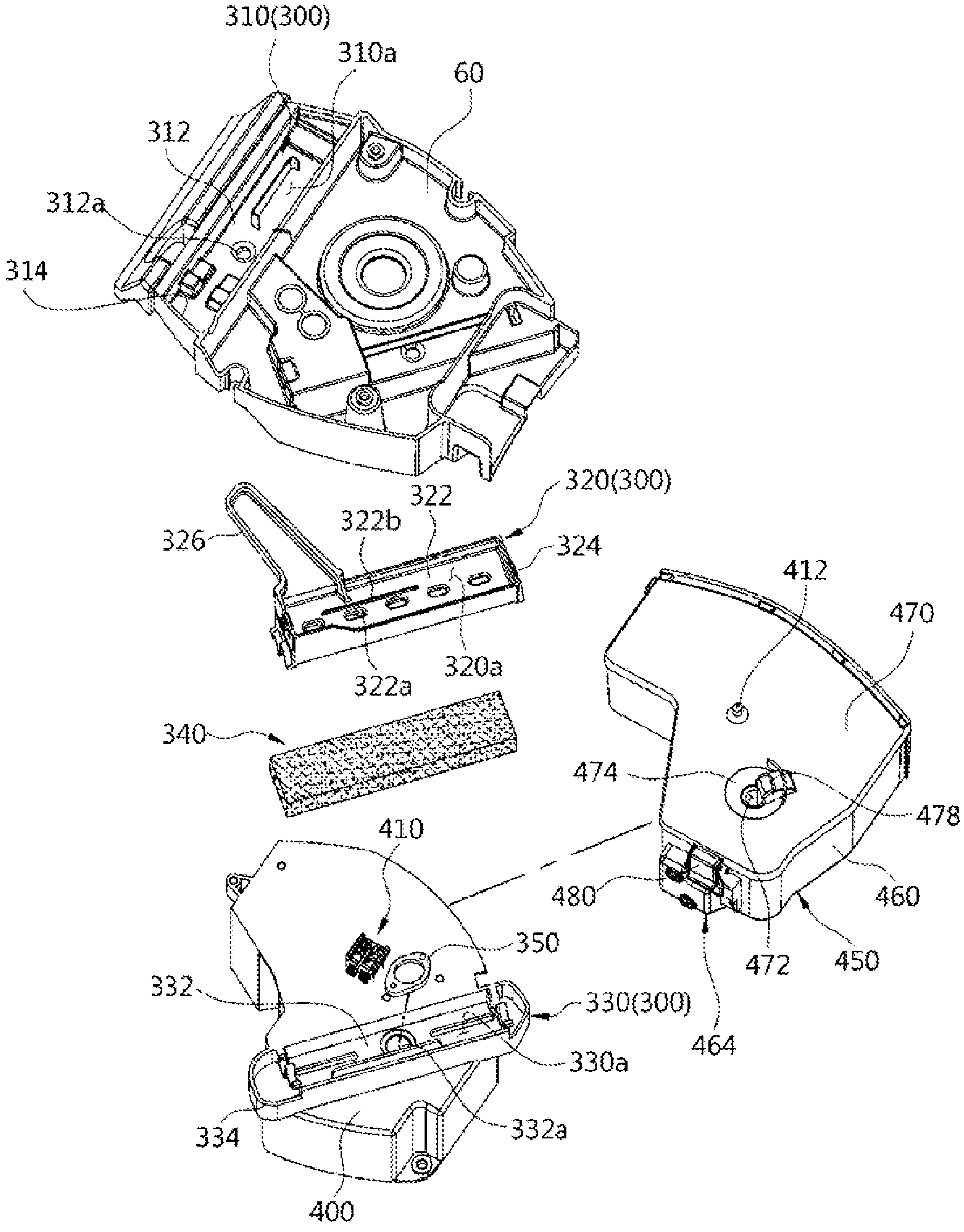

310(300)
310a
60
312
312a
314
320(300)
322
322b
326
324
322a
320a
412
470
340
474
478
410
480
460
350
472
450
332
330(300)
464
330a
334
332a
400

FIG. 9

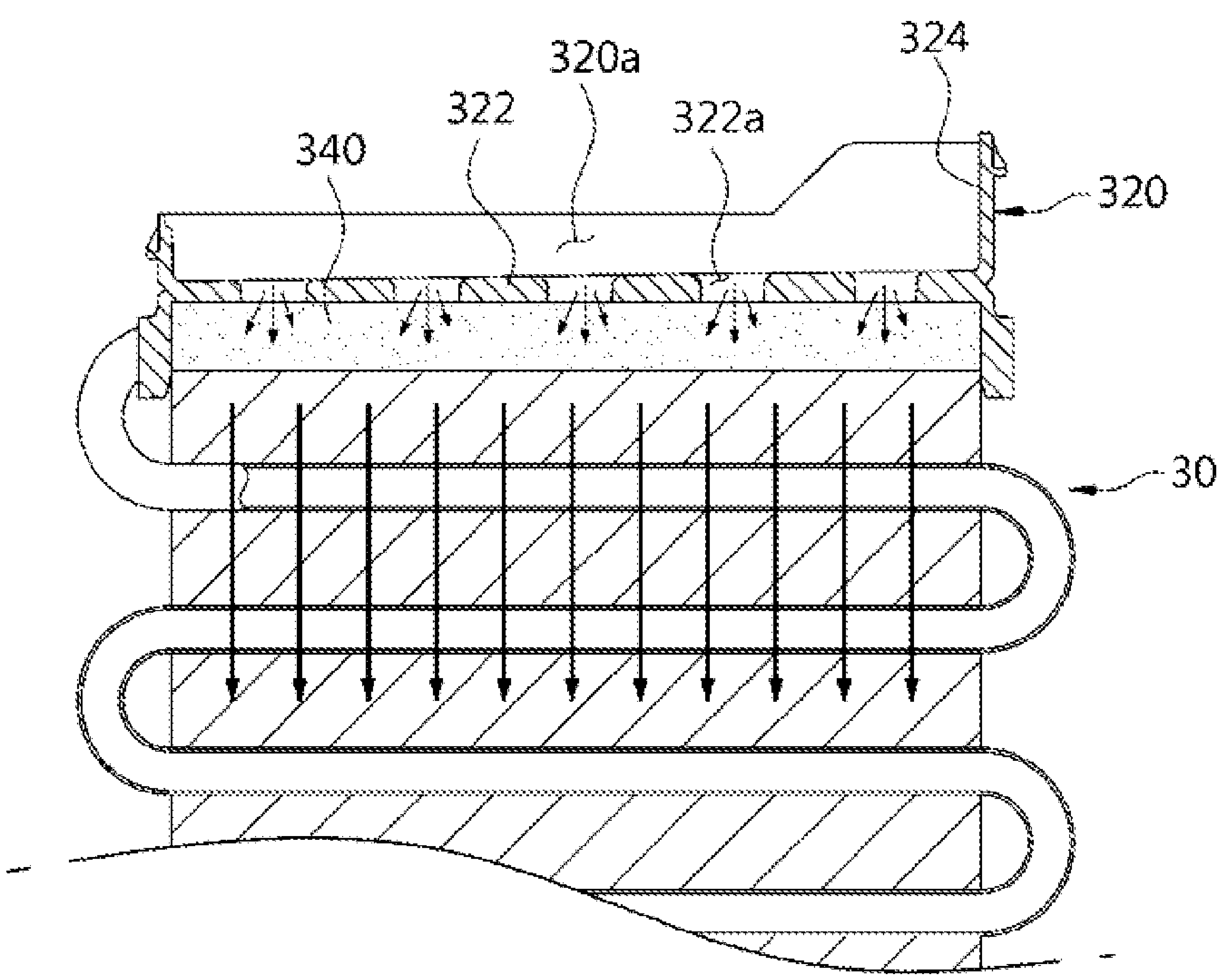


FIG. 10

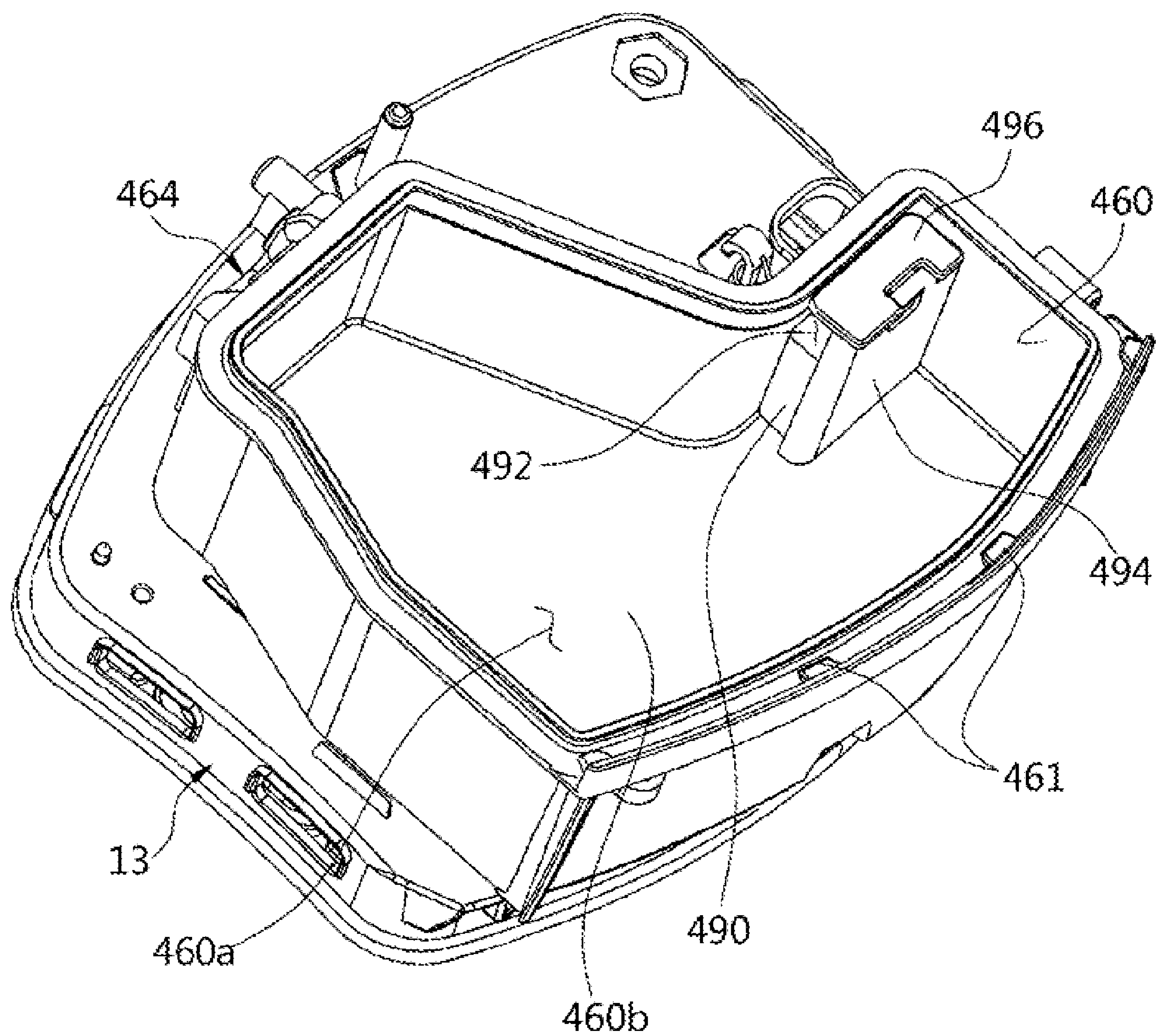


FIG. 11

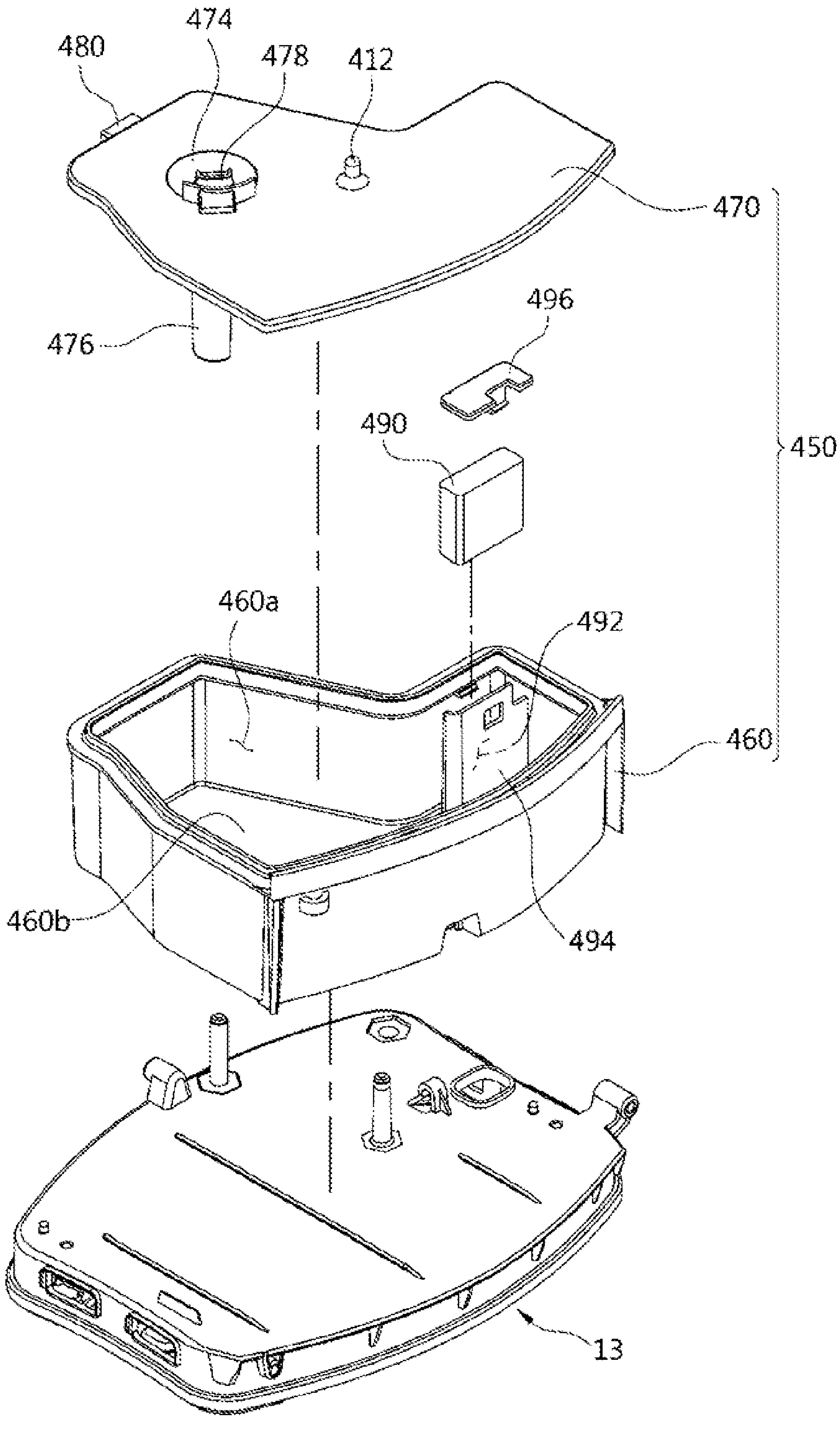


FIG. 12A

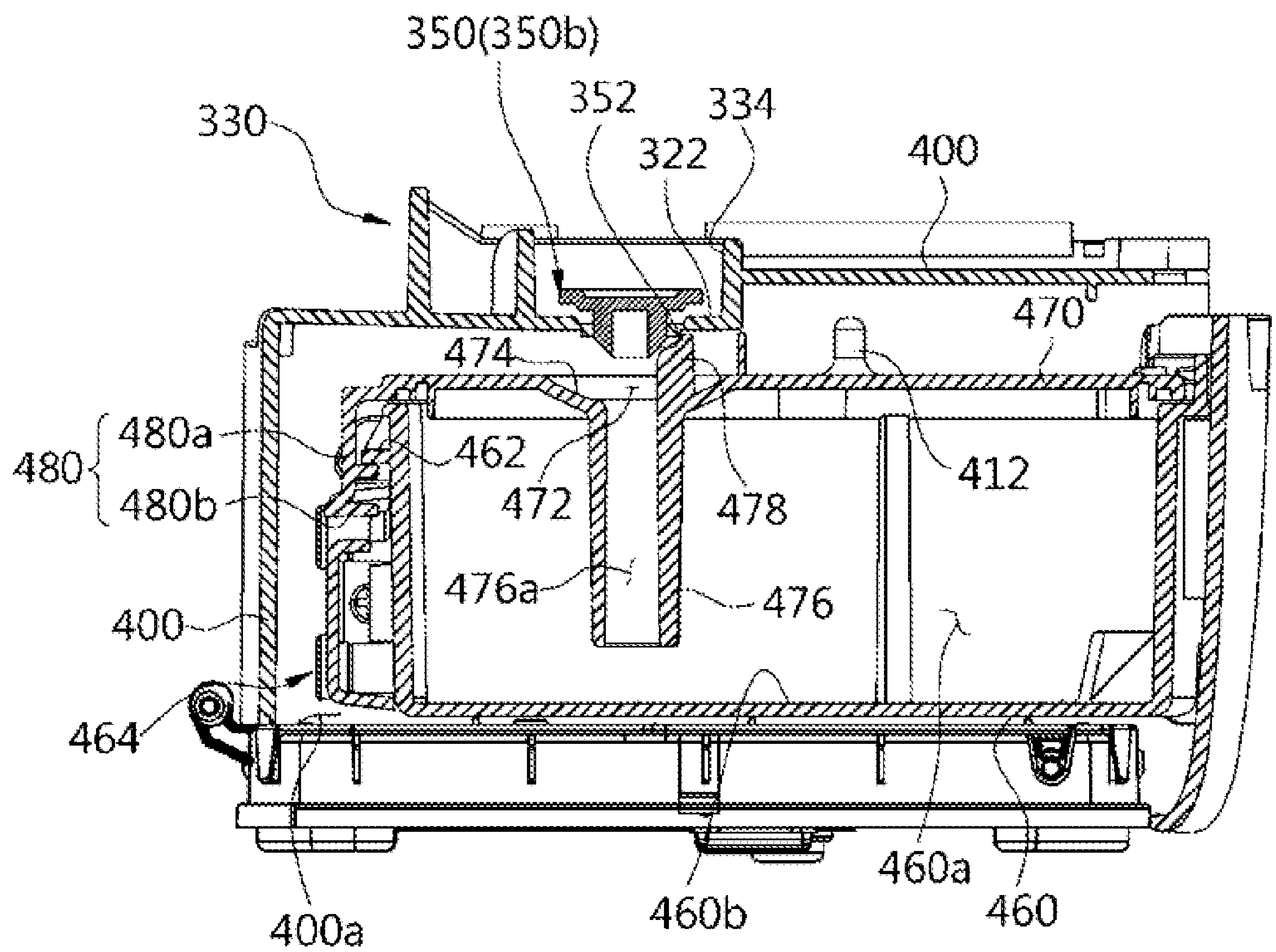

350(350b)
352
334
330
322
400
470
474
480
480a
462
412
472
478
480b
476a
476
400
464
400a
460b
460a
460

FIG. 12B

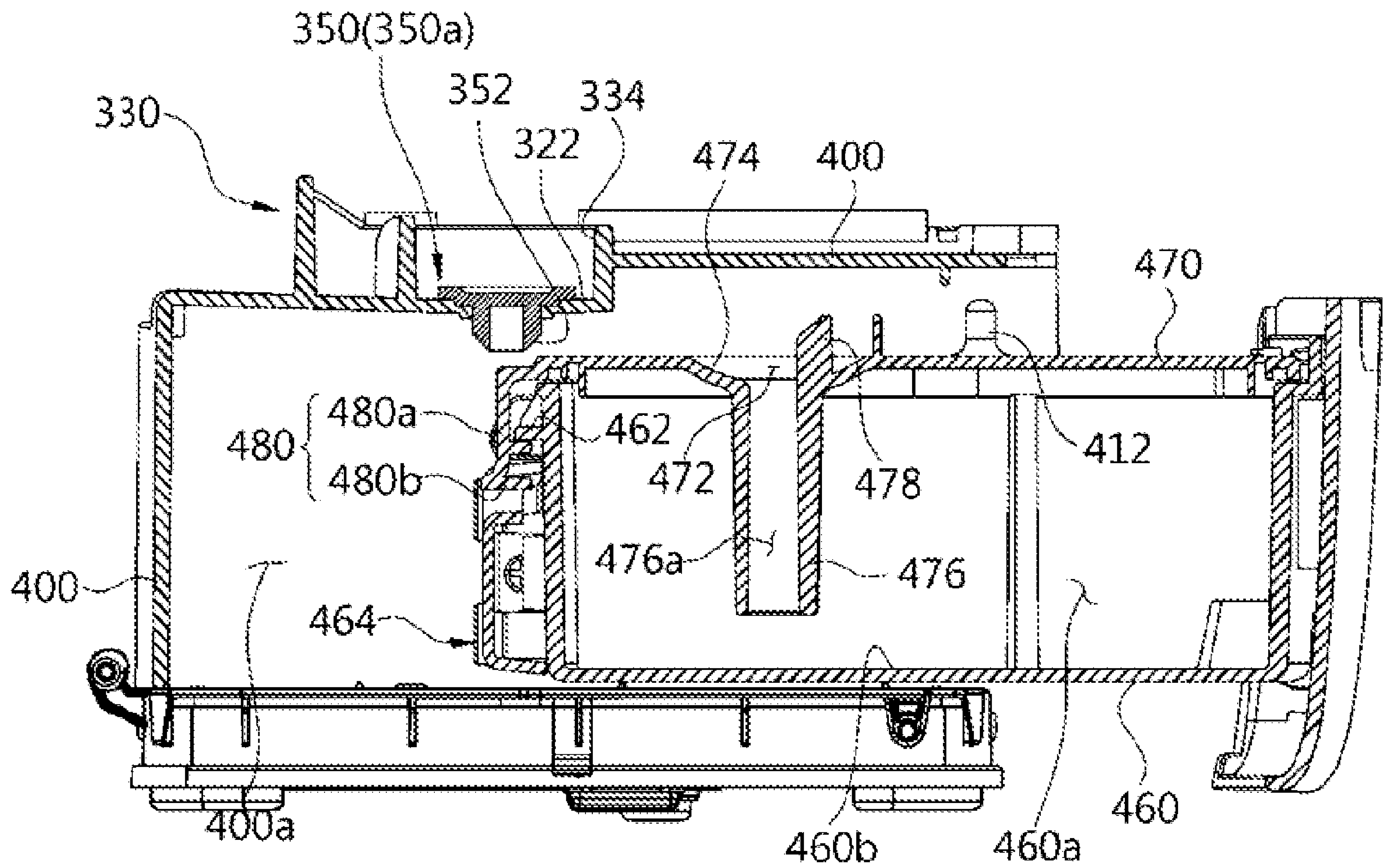

350(350a)
352
334
330
322
474
400
470
480a
480
480b
462
472
478
412
476a
476
400
464
400a
460b
460a
460

FIG. 13A

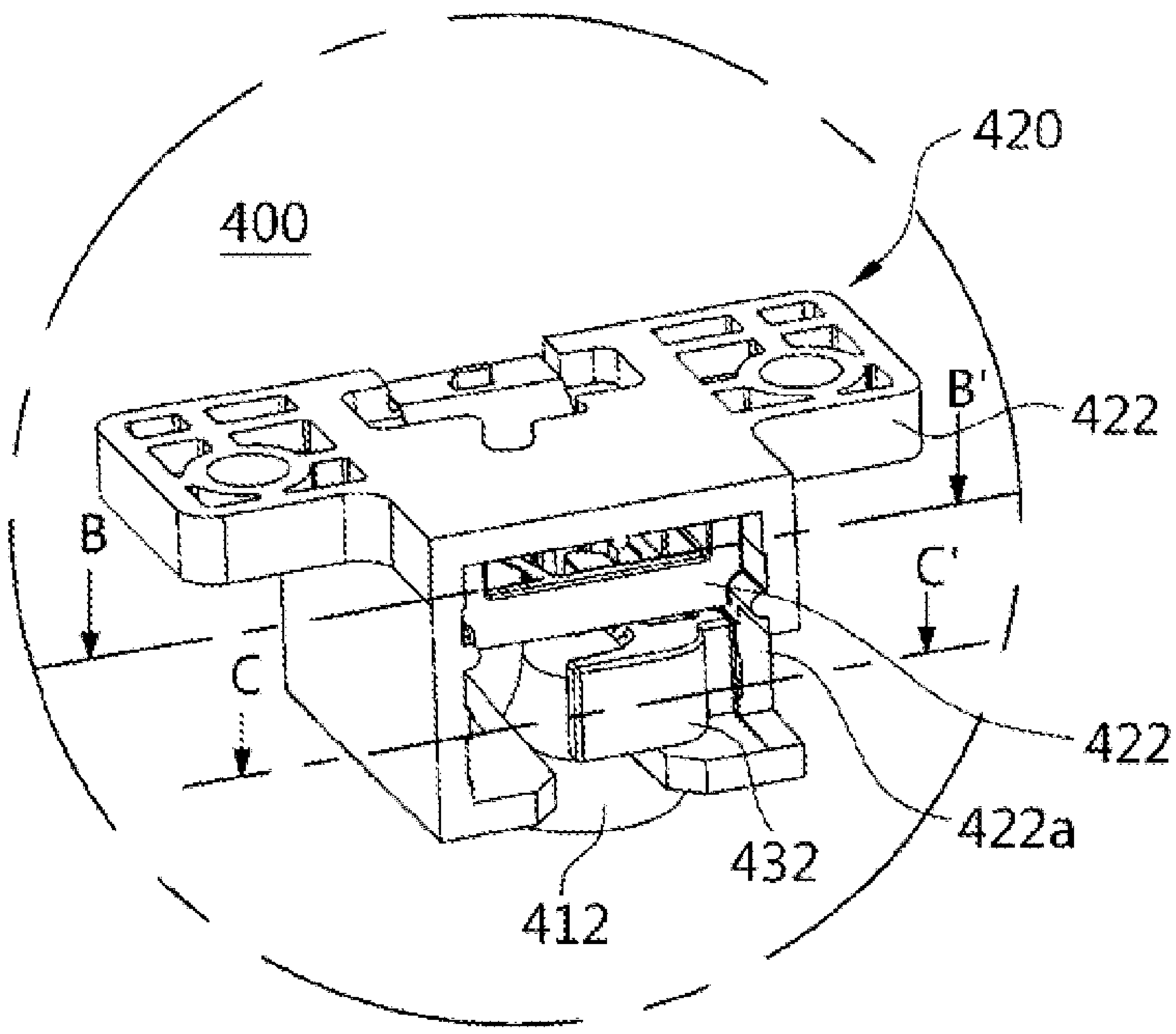


FIG. 13B

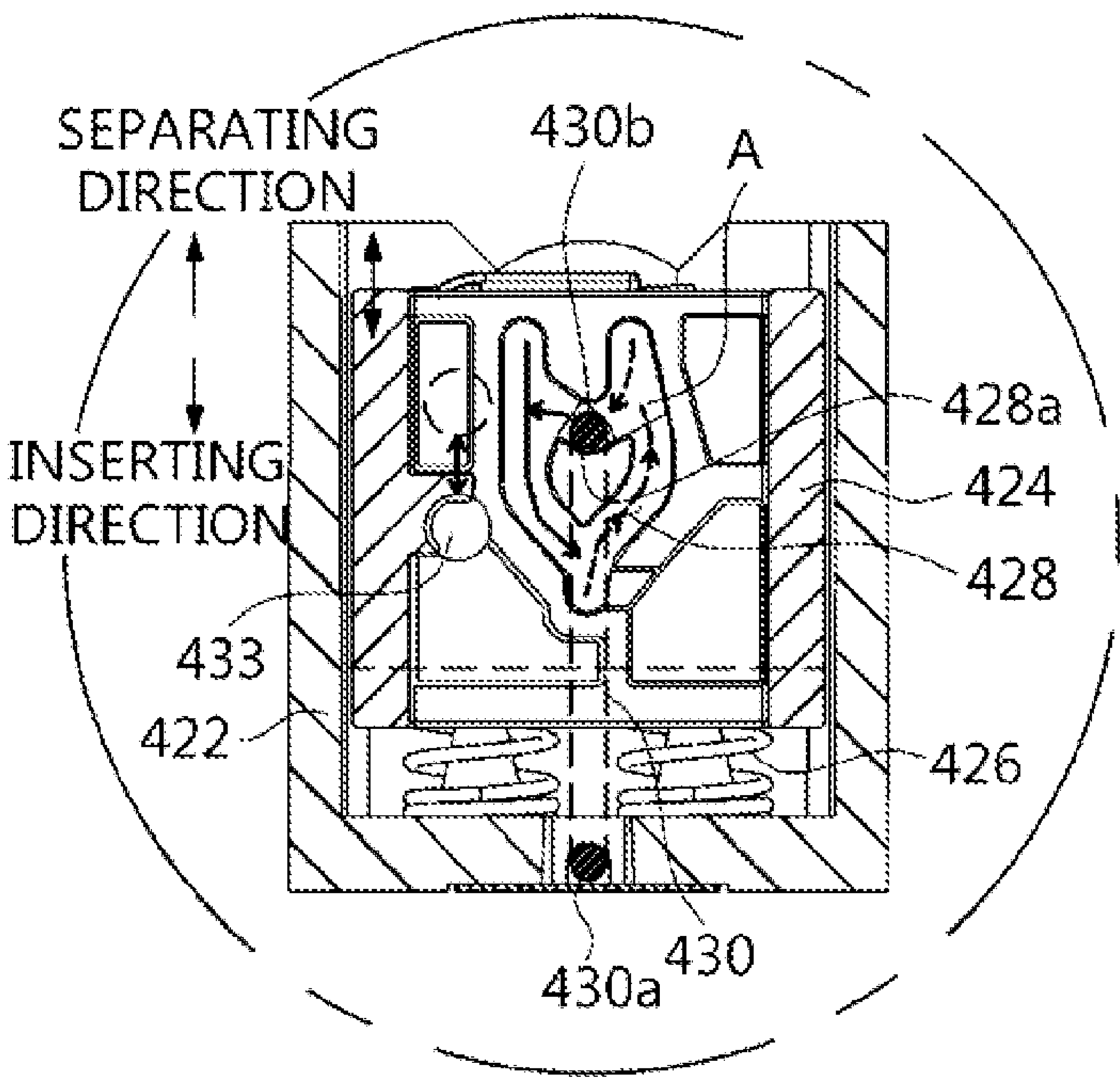

SEPARATING DIRECTION
INSERTING DIRECTION
430b
A
428a
424
428
433
422
426
430
430a

FIG. 13C

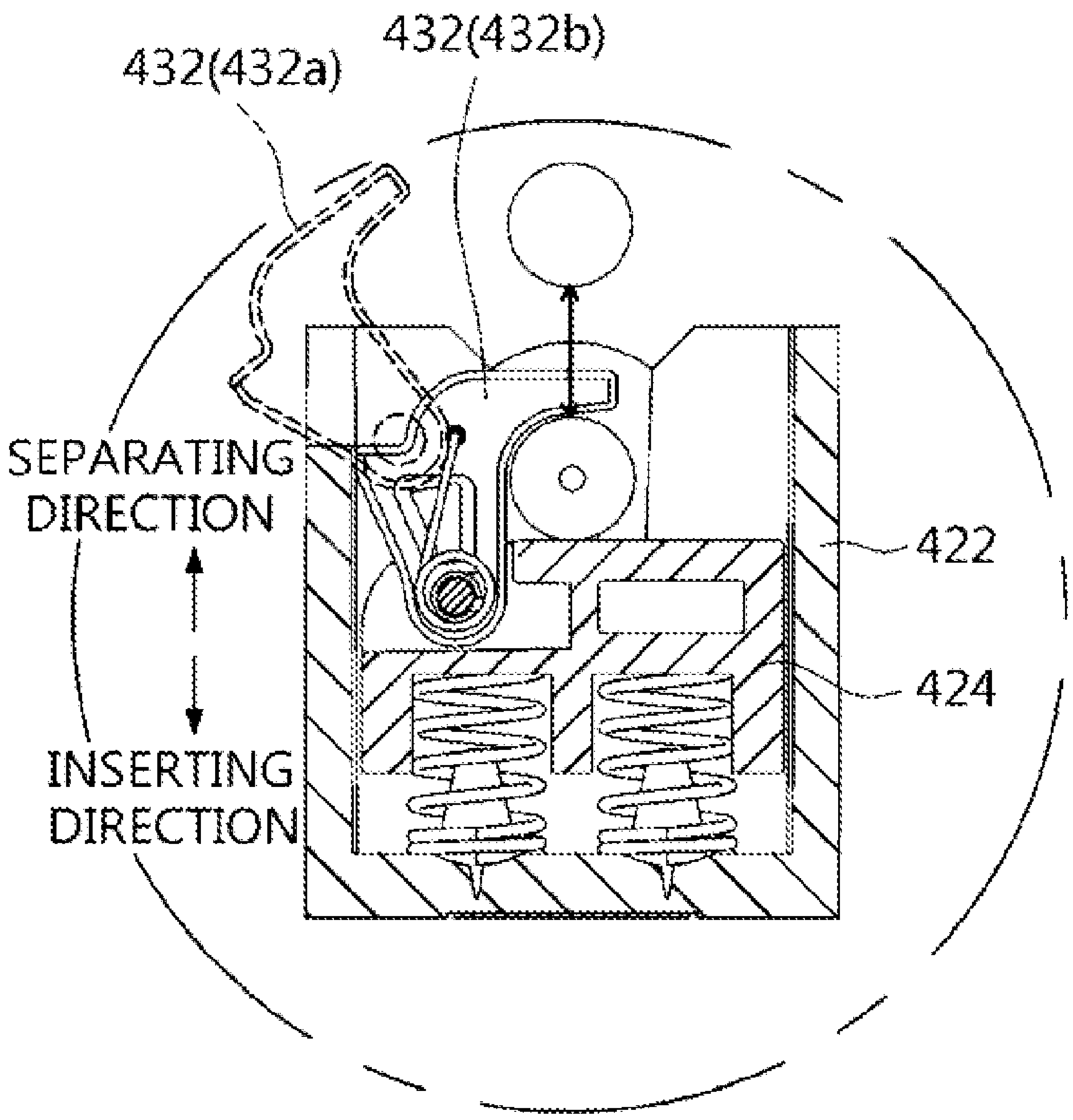

432(432a)
432(432b)
SEPARATING DIRECTION
INSERTING DIRECTION
422
424

FIG. 14

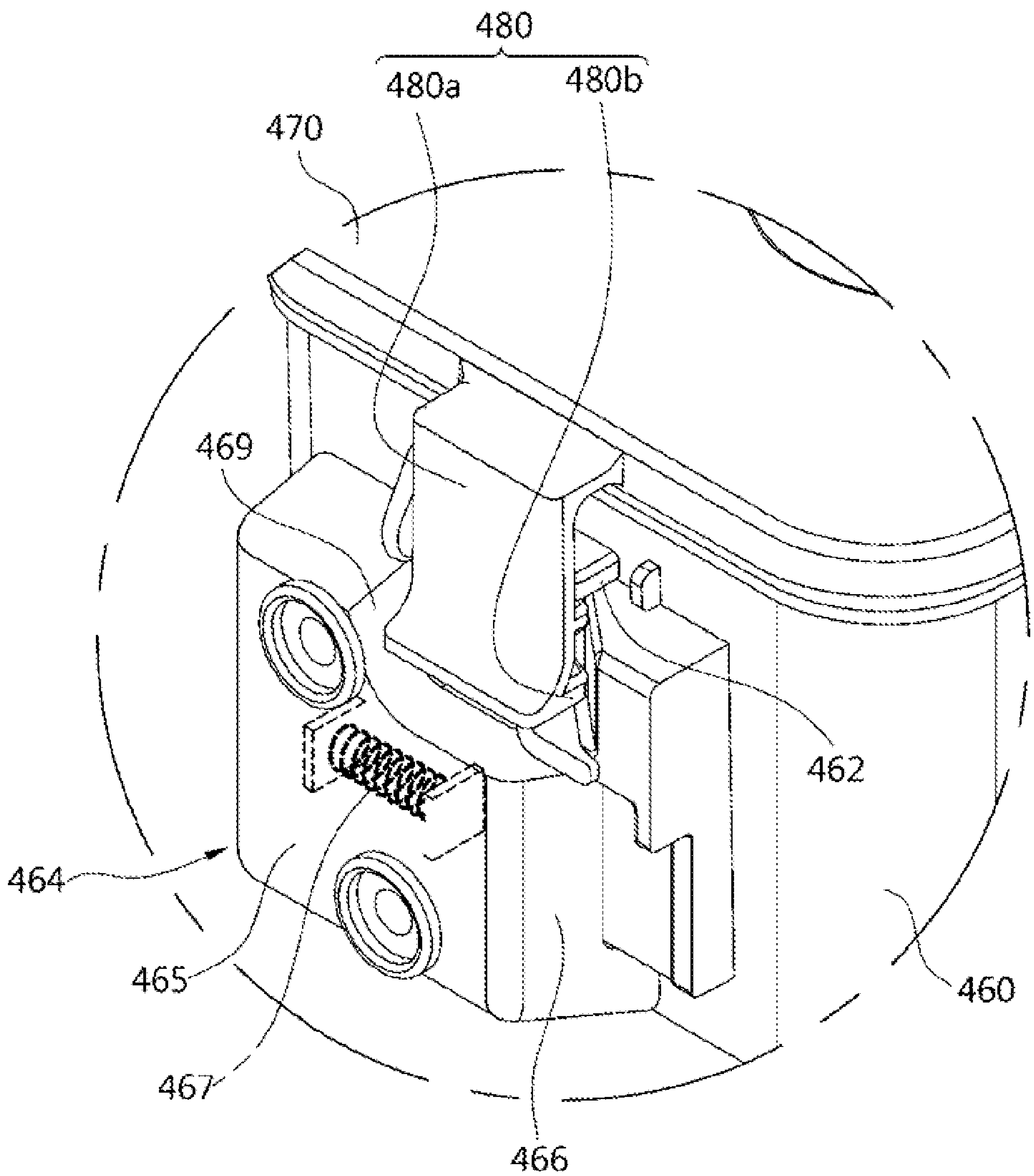


FIG. 15

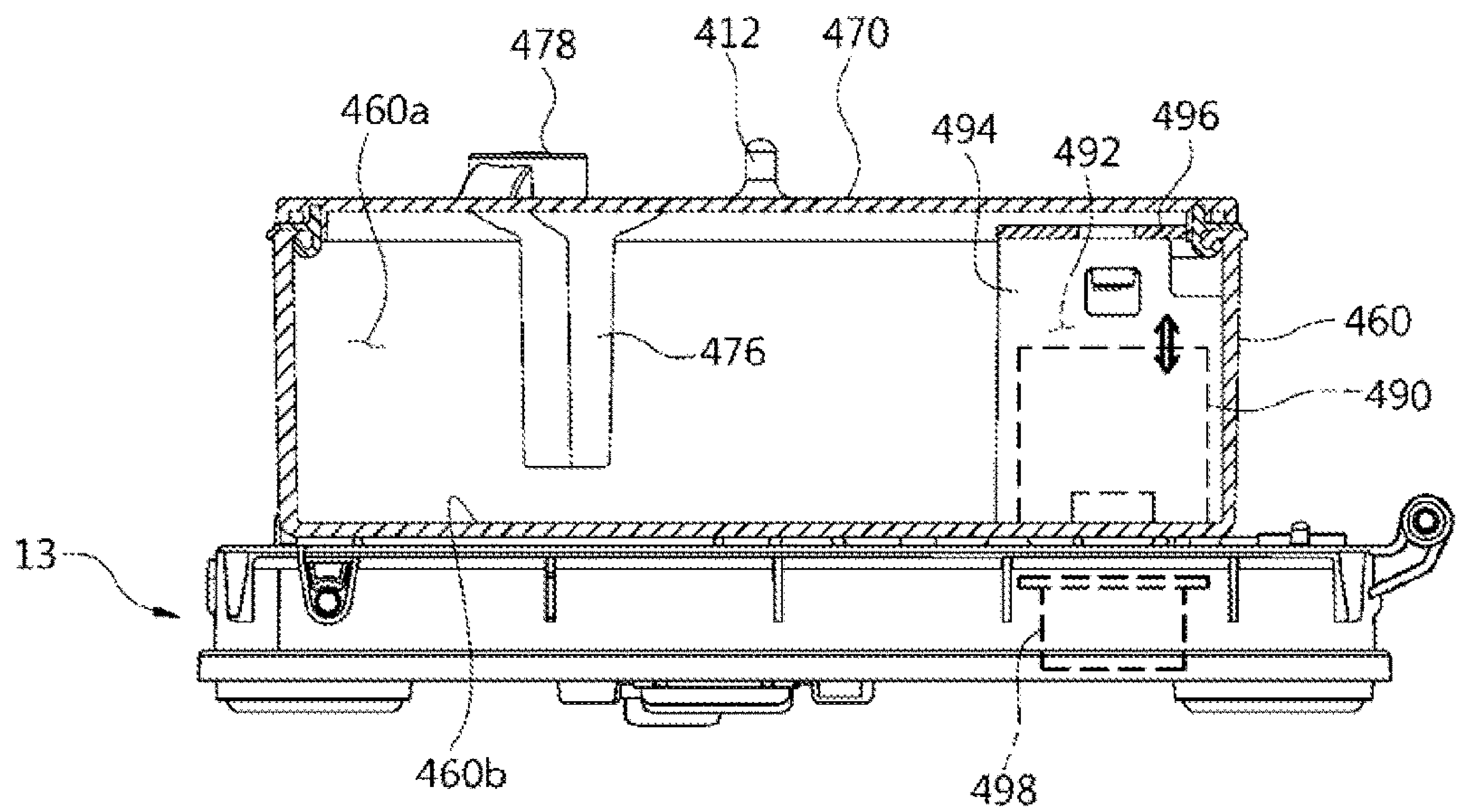


FIG. 16A

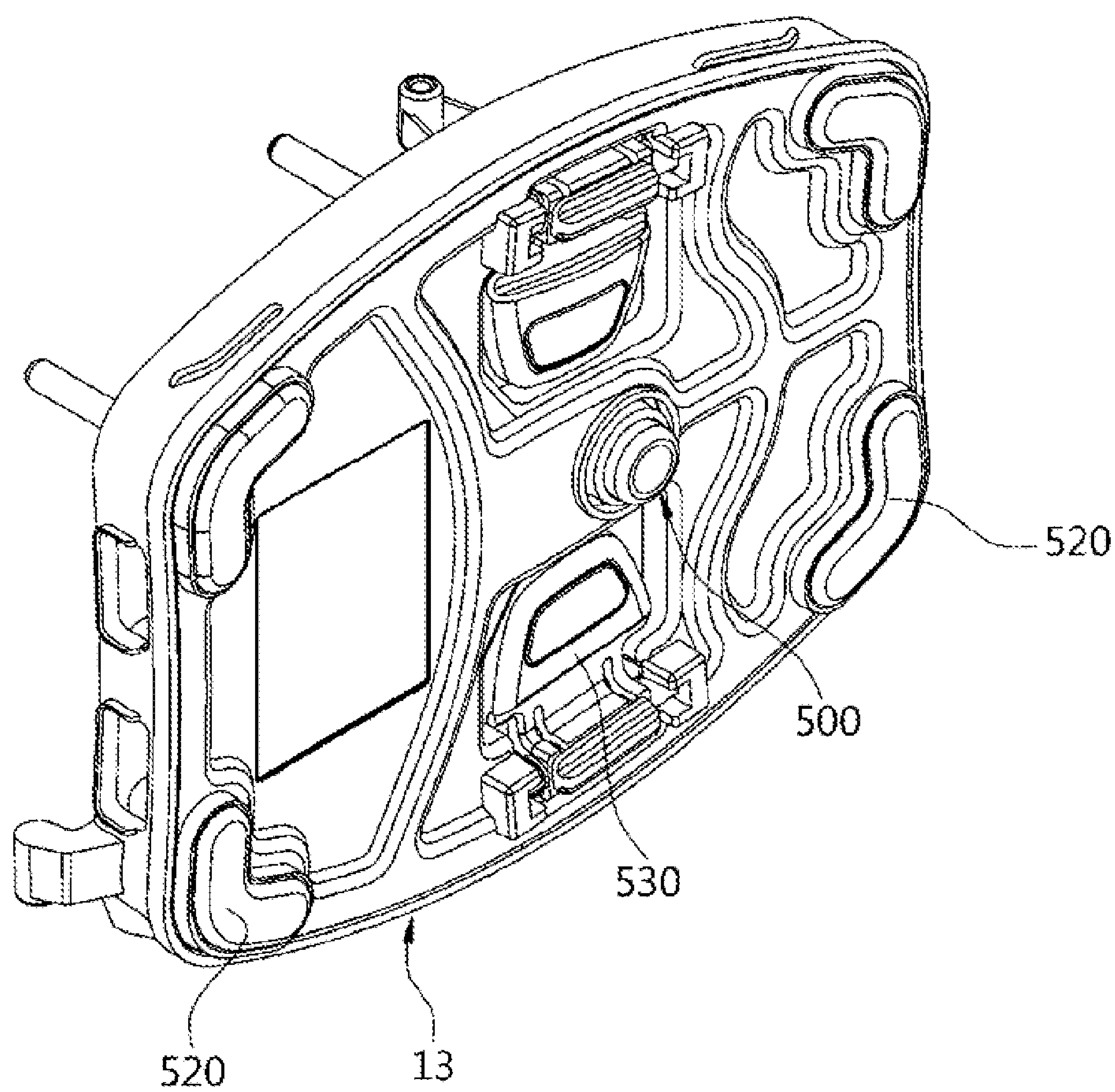


FIG. 16B

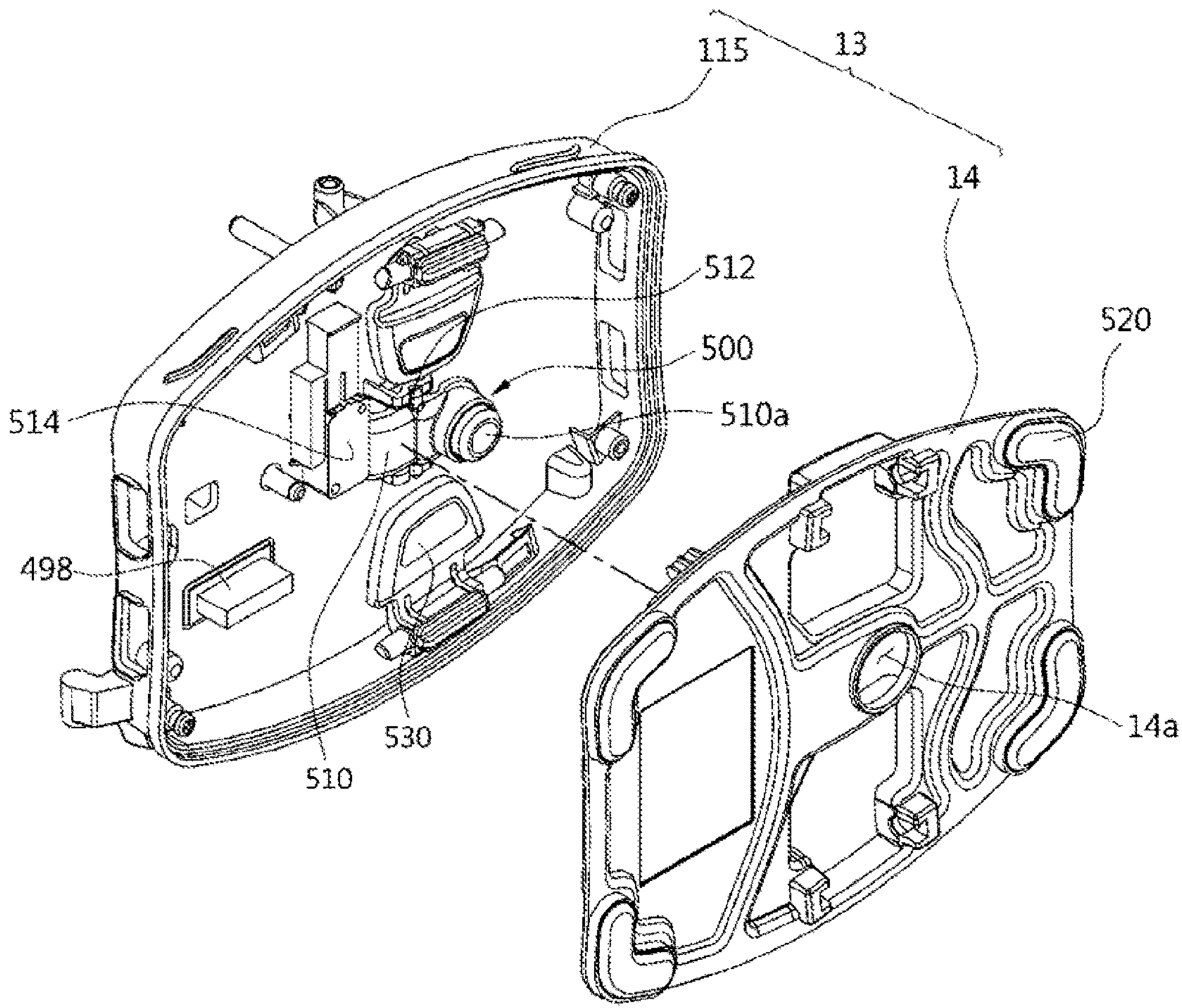


FIG. 17A

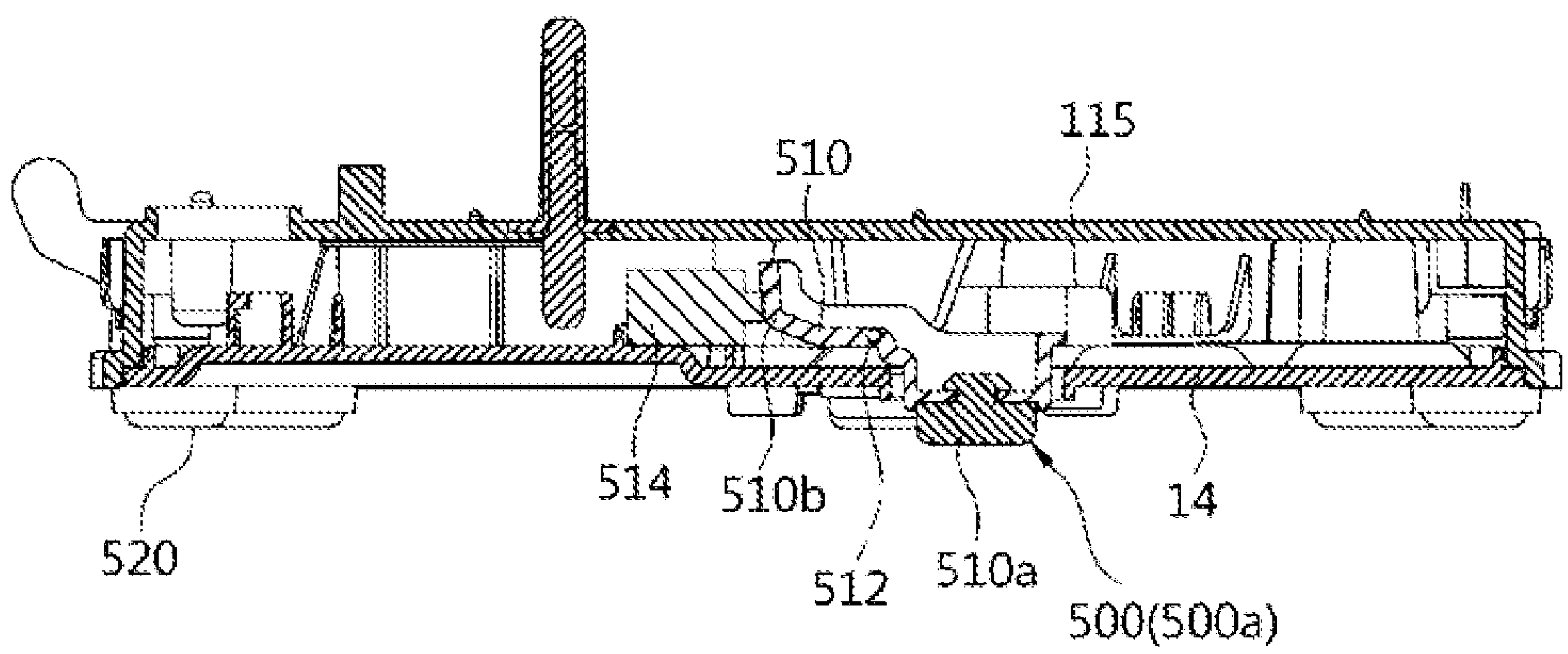


FIG. 17B

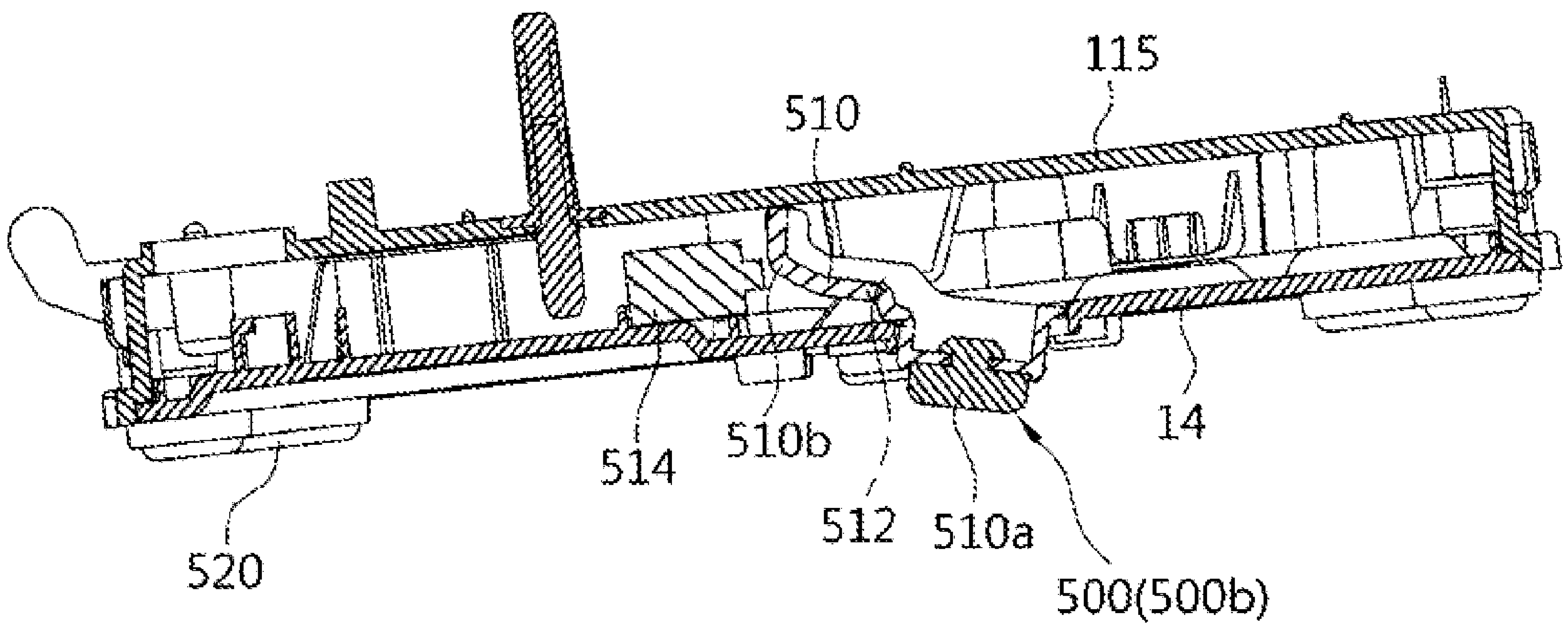


FIG. 18

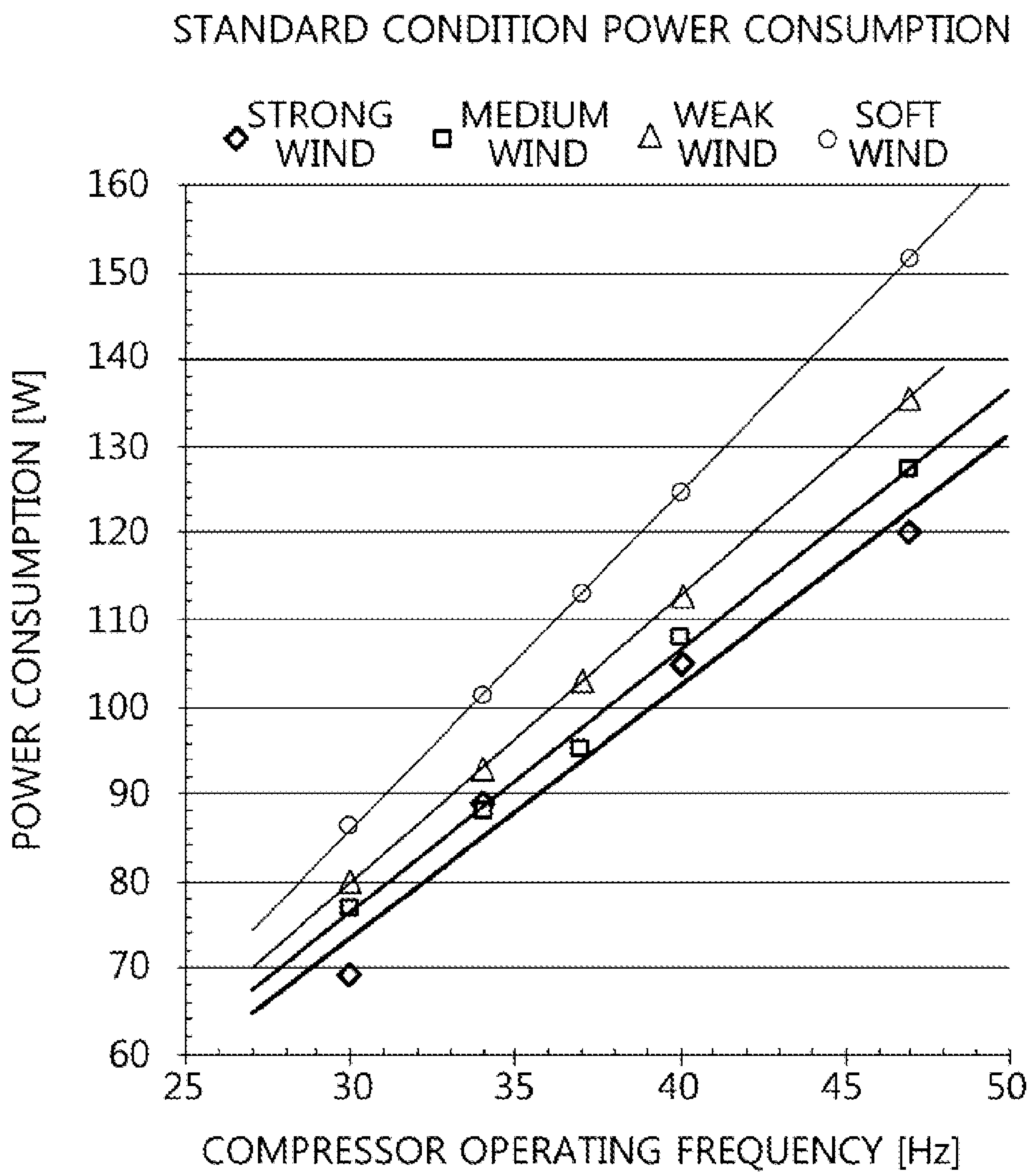

STANDARD CONDITION POWER CONSUMPTION
STRONG WIND
MEDIUM WIND
WEAK WIND
SOFT WIND
POWER CONSUMPTION [W]
160
150
140
130
120
110
100
90
80
70
60
25
30
35
40
45
50
COMPRESSOR OPERATING FREQUENCY [Hz]

FIG. 19

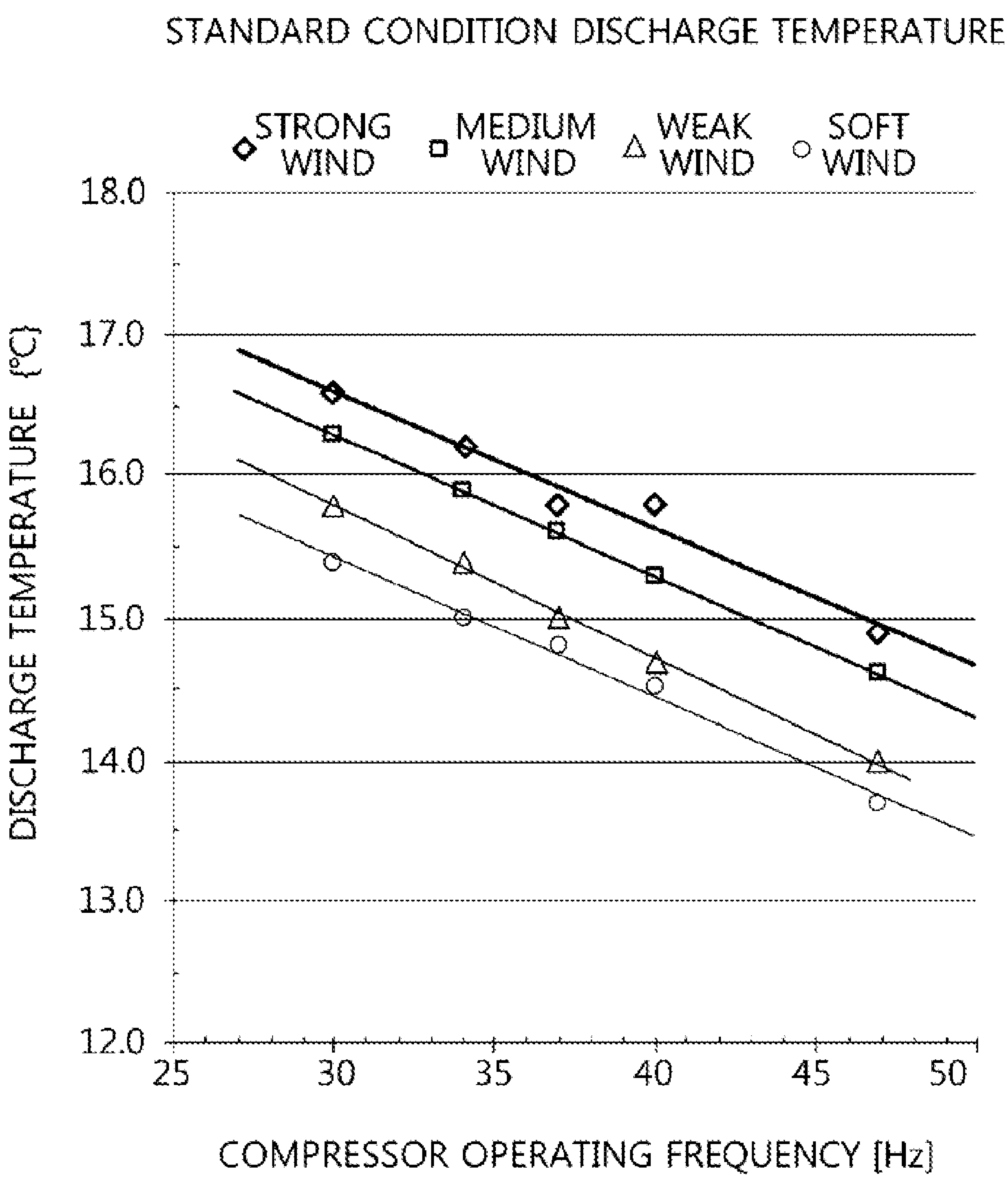

STANDARD CONDITION DISCHARGE TEMPERATURE
STRONG WIND
MEDIUM WIND
WEAK WIND
SOFT WIND
DISCHARGE TEMPERATURE [°C]
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25
30
35
40
45
50
COMPRESSOR OPERATING FREQUENCY [Hz]

FIG. 20

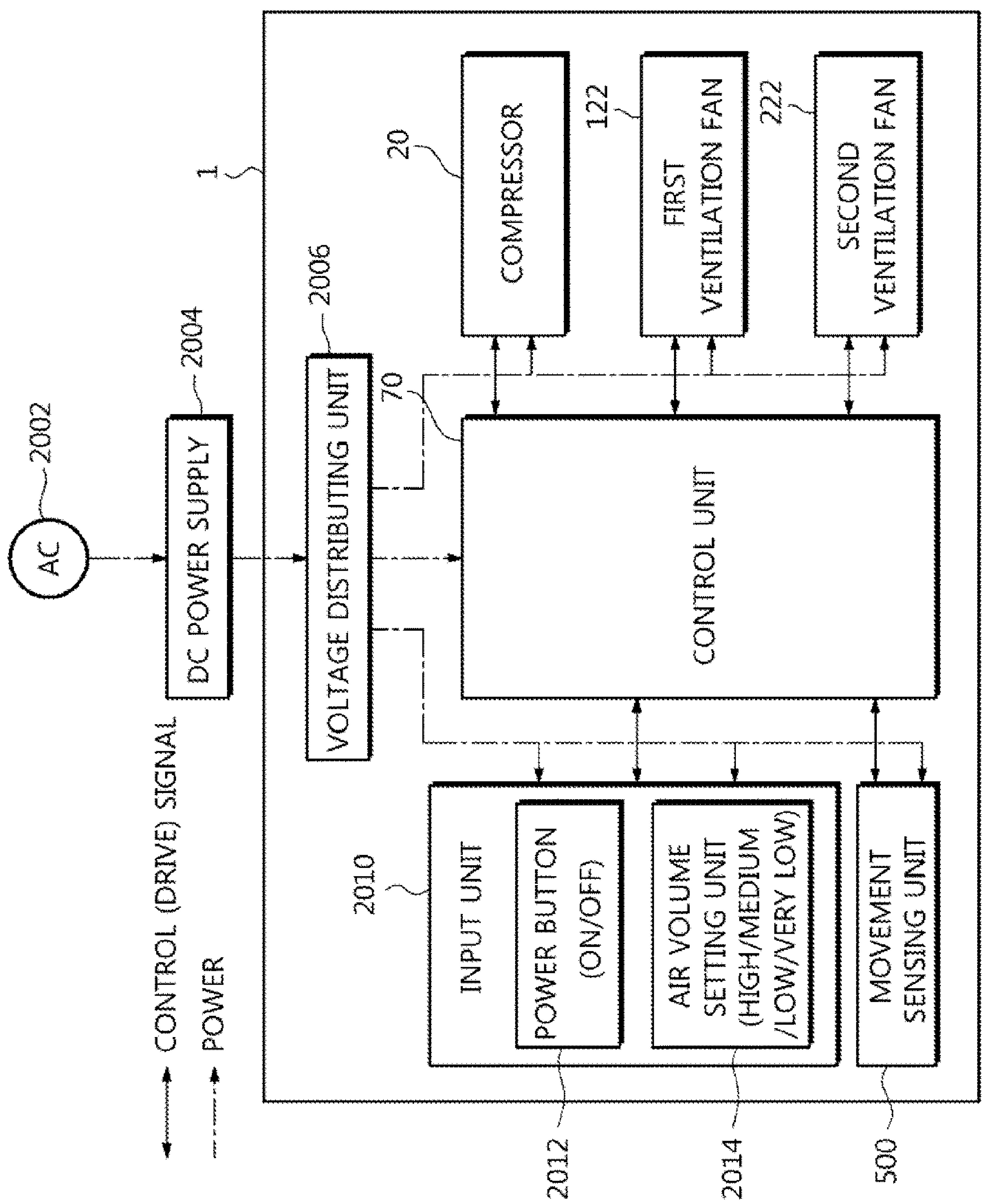

AC
2002
DC POWER SUPPLY
2004
VOLTAGE DISTRIBUTING UNIT
2006
1
70
CONTROL UNIT
COMPRESSOR
20
FIRST VENTILATION FAN
122
SECOND VENTILATION FAN
222
INPUT UNIT
2010
POWER BUTTON (ON/OFF)
AIR VOLUME SETTING UNIT (HIGH/MEDIUM /LOW/VERY LOW)
MOVEMENT SENSING UNIT
2012
2014
500
CONTROL (DRIVE) SIGNAL
POWER

FIG. 21

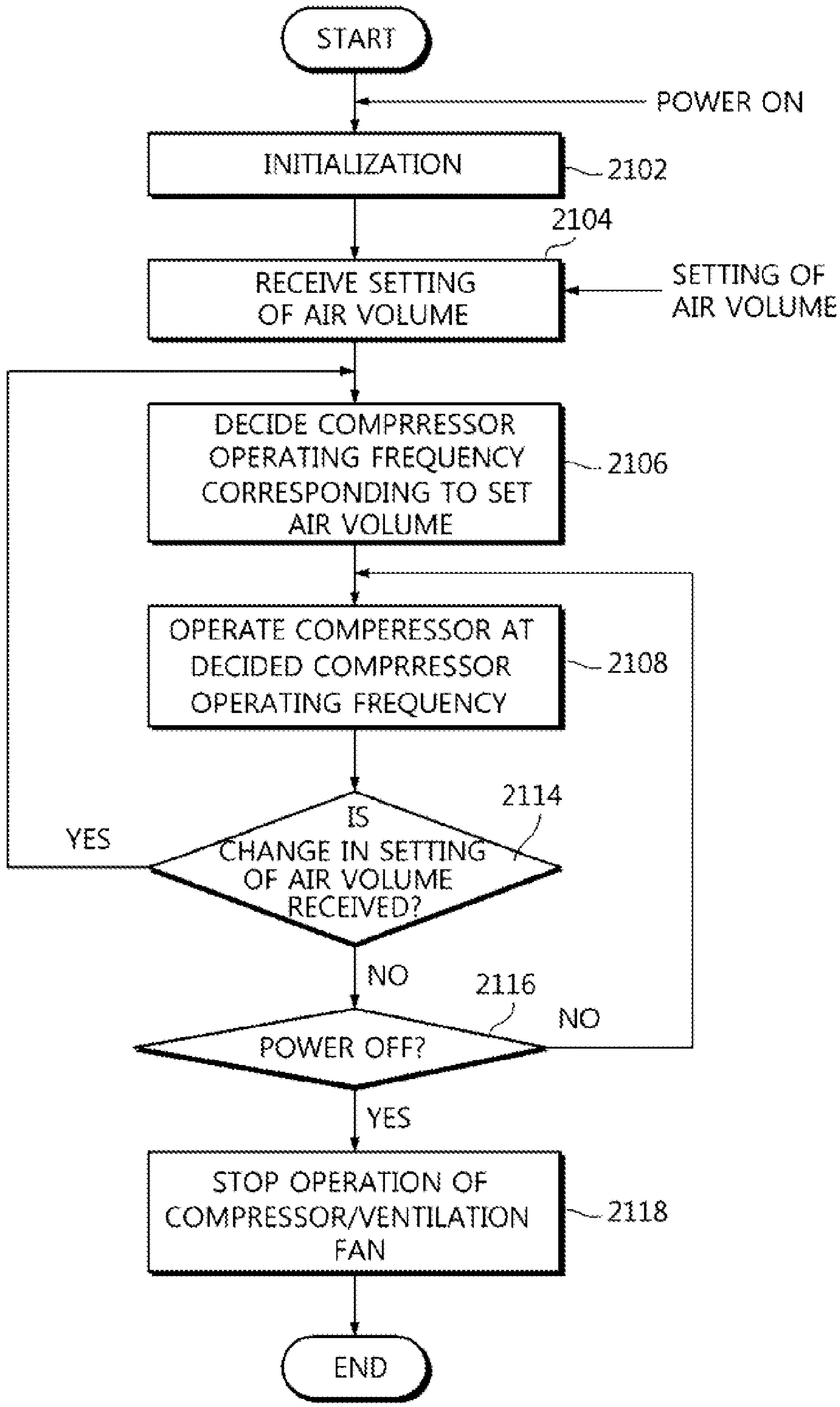

START
POWER ON
INITIALIZATION
2102
2104
RECEIVE SETTING OF AIR VOLUME
SETTING OF AIR VOLUME
DECIDE COMPRRESSOR OPERATING FREQUENCY CORRESPONDING TO SET AIR VOLUME
2106
OPERATE COMPERESSOR AT DECIDED COMPRRESSOR OPERATING FREQUENCY
2108
2114
YES
IS CHANGE IN SETTING OF AIR VOLUME RECEIVED?
NO
2116
NO
POWER OFF?
YES
STOP OPERATION OF COMPRESSOR/VENTILATION FAN
2118
END

FIG. 22

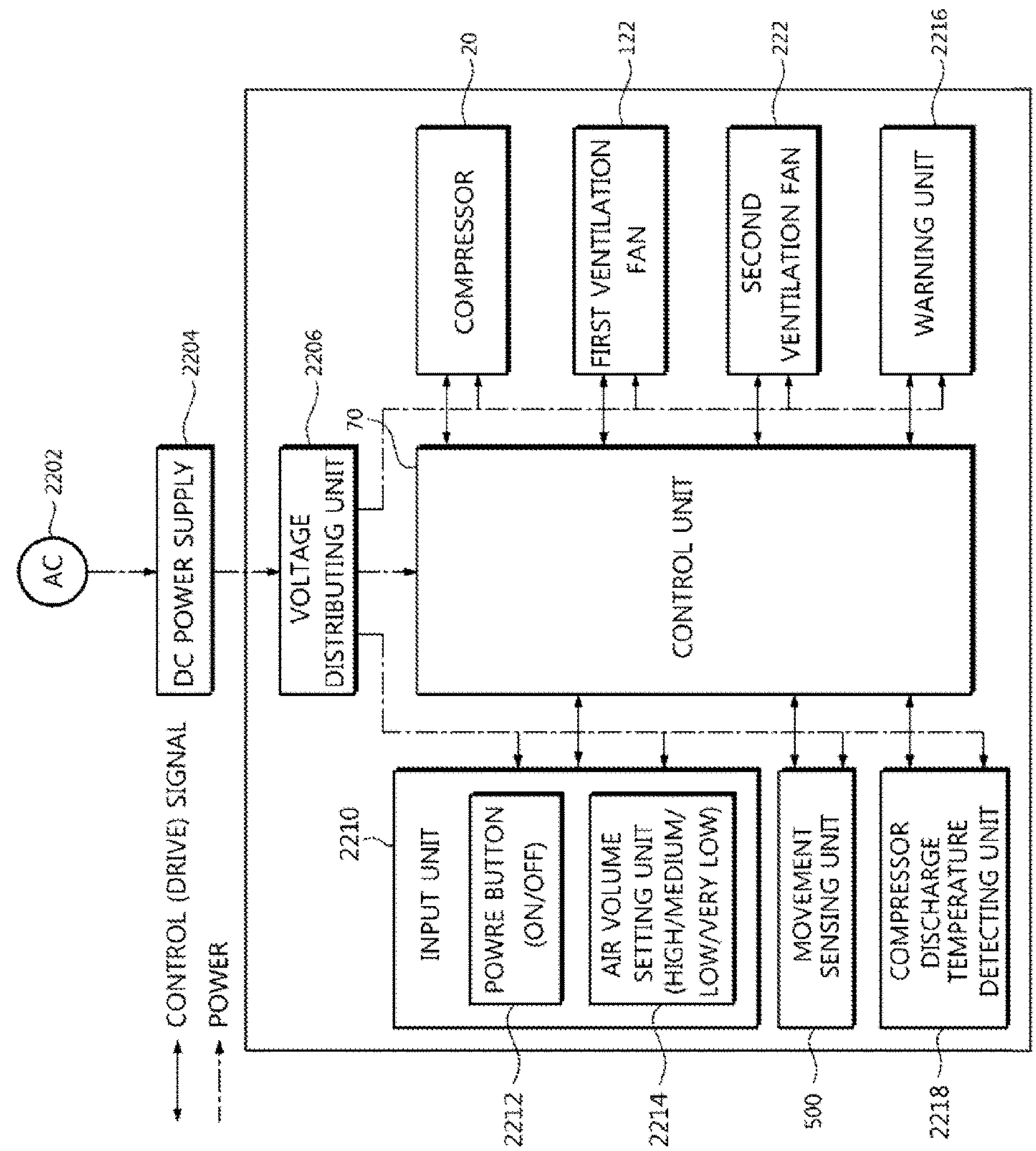
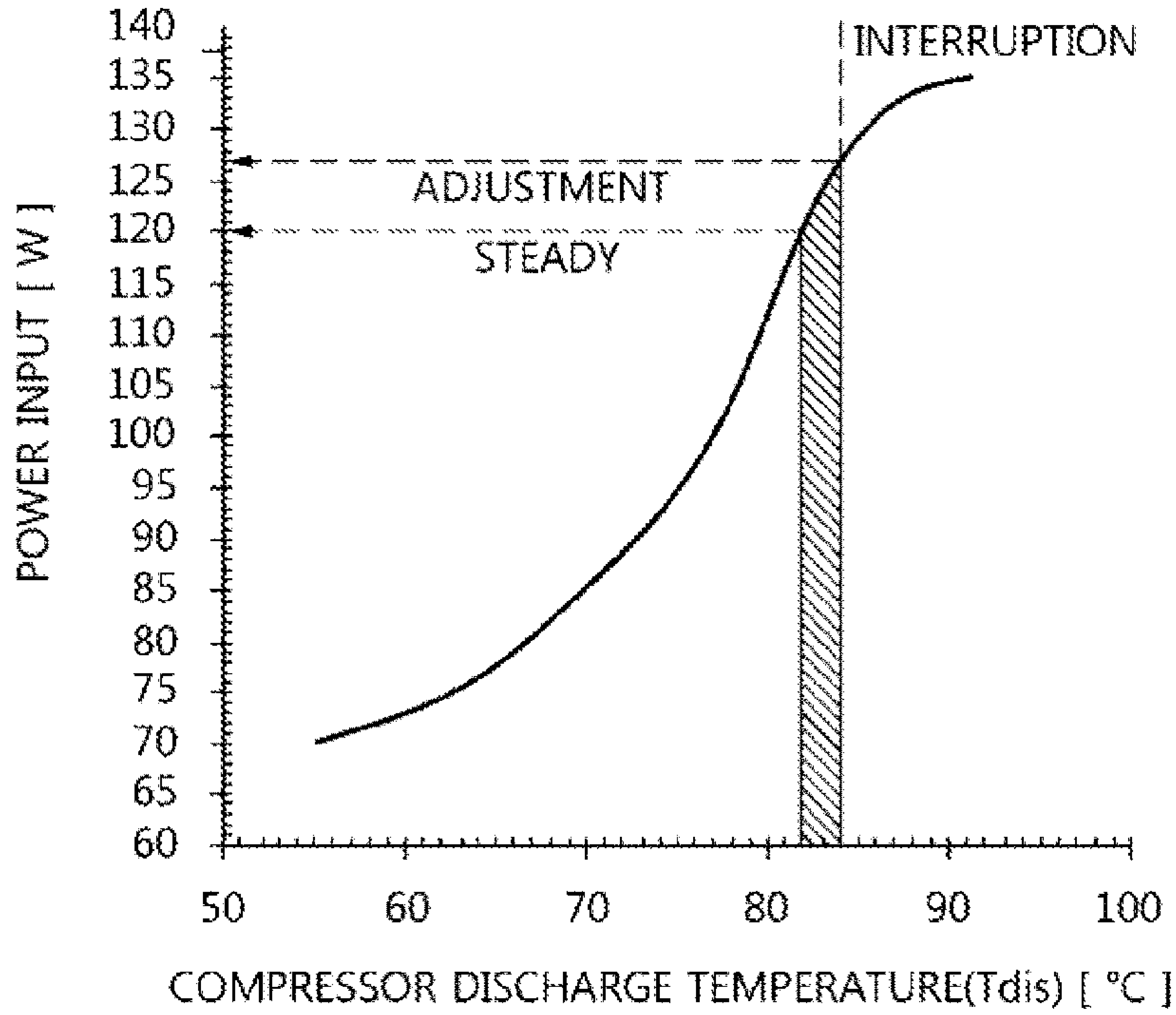
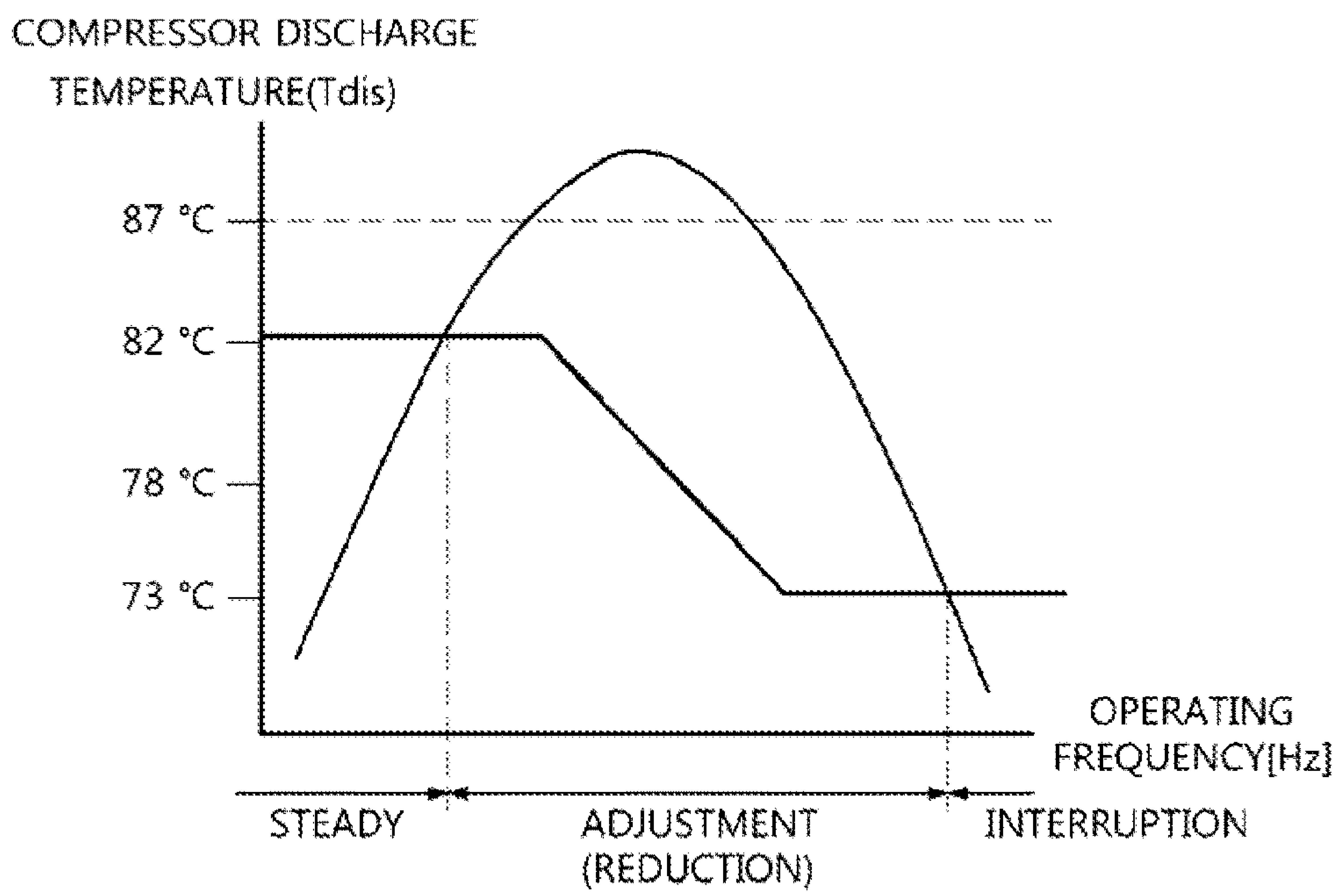

CONTROL (DRIVE) SIGNAL
POWER
AC
2202
DC POWER SUPPLY
2204
VOLTAGE DISTRIBUTING UNIT
2206
70
CONTROL UNIT
COMPRESSOR
20
FIRST VENTILATION FAN
122
SECOND VENTILATION FAN
222
WARNING UNIT
2216
INPUT UNIT
2210
POWRE BUTTON (ON/OFF)
2212
AIR VOLUME SETTING UNIT (HIGH/MEDIUM/ LOW/VERY LOW)
2214
MOVEMENT SENSING UNIT
500
COMPRESSOR DISCHARGE TEMPERATURE DETECTING UNIT
2218

FIG. 23

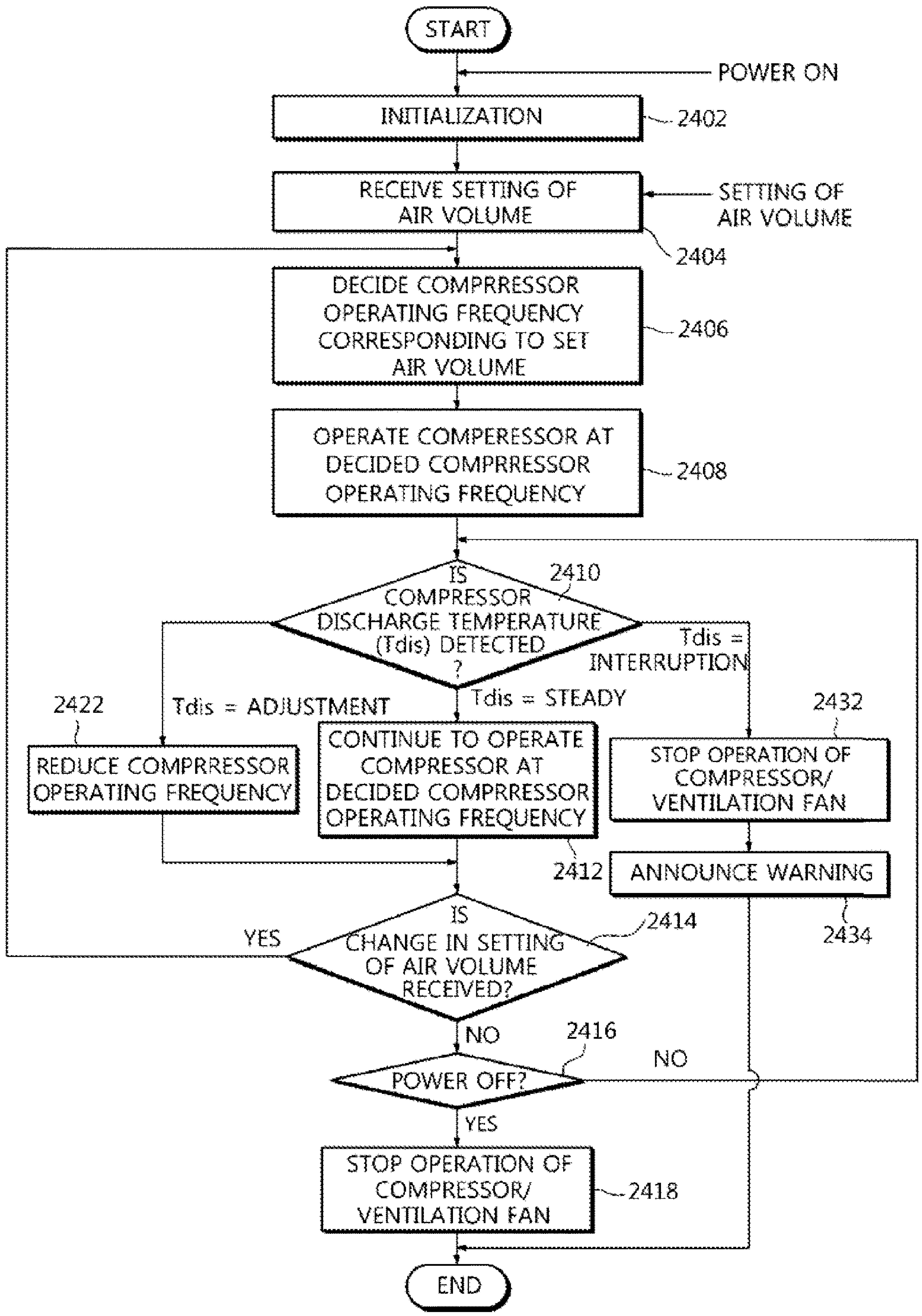

140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
POWER INPUT [W]
INTERRUPTION
ADJUSTMENT
STEADY
50
60
70
80
90
100
COMPRESSOR DISCHARGE TEMPERATURE(Tdis) [°C]

(A)


COMPRESSOR DISCHARGE
TEMPERATURE(Tdis)
87 °C
82 °C
78 °C
73 °C
OPERATING
FREQUENCY[Hz]
STEADY
ADJUSTMENT
(REDUCTION)
INTERRUPTION

(B)

FIG. 24



START
POWER ON
INITIALIZATION
2402
RECEIVE SETTING OF AIR VOLUME
SETTING OF AIR VOLUME
2404
DECIDE COMPRRESSOR OPERATING FREQUENCY CORRESPONDING TO SET AIR VOLUME
2406
OPERATE COMPERESSOR AT DECIDED COMPRRESSOR OPERATING FREQUENCY
2408
IS COMPRESSOR DISCHARGE TEMPERATURE (Tdis) DETECTED ?
2410
Tdis = ADJUSTMENT
Tdis = STEADY
Tdis = INTERRUPTION
2422
REDUCE COMPRRESSOR OPERATING FREQUENCY
CONTINUE TO OPERATE COMPRESSOR AT DECIDED COMPRRESSOR OPERATING FREQUENCY
2412
2432
STOP OPERATION OF COMPRESSOR/ VENTILATION FAN
ANNOUNCE WARNING
2434
IS CHANGE IN SETTING OF AIR VOLUME RECEIVED?
2414
YES
NO
2416
POWER OFF?
NO
YES
STOP OPERATION OF COMPRESSOR/ VENTILATION FAN
2418
END

AIR CONDITIONER INCLUDING A HANDLE AND METHOD OF CONTROLLING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Patent Application Nos. 10-2014-0031484 and 10-2014-0069740, filed on Mar. 18, 2014 and Jun. 9, 2014, respectively, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND

1. Field

One or more embodiments of the present disclosure relate to an air conditioner and a method of controlling the same and, more particularly, to an integral air conditioner in which an outdoor unit and an indoor unit are combined and a method of controlling the same.

2. Description of the Related Art

Air conditioners are devices for controlling suitable conditions for human activities such as a temperature, humidity, an air stream, air distribution, etc. using a refrigeration cycle and simultaneously removing foreign materials such as dust in the air. Main components constituting the refrigeration cycle include a compressor, a condenser, an evaporator, a ventilation fan, and so on.

The air conditioners are classified as split air conditioners in which an indoor unit and an outdoor unit are separately installed, and integral air conditioners in which an indoor unit and an outdoor unit are installed together in one cabinet.

The integral air conditioner is generally installed across a wall or a window in such a manner that the indoor unit portion is directed indoors and the outdoor unit portion is directed outdoors.

The integral air conditioner is bulky, and must occupy a part of the wall or window, which has a negative effect from an aesthetic viewpoint.

SUMMARY

Therefore, it is an aspect of the present disclosure to provide an air conditioner that is easily installed and can be changed in position and place as needed, and a method of controlling the same.

It is another aspect of the present disclosure to provide an air conditioner that provides cooled or heated air for a user without communicating with an outdoor area divided from an indoor area, and a method of controlling the same.

It is yet another aspect of the present disclosure to efficiently control power consumption of a power supply in order to more conveniently use an air conditioner provided for easy installation and movement.

Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the disclosure.

According to an aspect of the present disclosure, there is provided an air conditioner which includes: a housing including a first space in which a first suction port and a first discharge port are formed, and a second space in which a second suction port and a second discharge port are formed and which is divided from the first space; a compressor provided to compress a refrigerant in the housing; a condenser that is provided in the second space and condenses the refrigerant compressed by the compressor into a liquid phase; an expansion unit expanding the refrigerant condensed by the condenser in a low pressure state; an evaporator that is provided in the first space and evaporates the refrigerant discharged from the expansion unit to exchange heat with ambient air; a water tank in which a condensate is stored; and a tray assembly that discharges the condensate generated from the evaporator to the condenser in a cooling mode and discharges the condensate generated from the evaporator to the water tank in a dehumidifying mode.

Here, the tray assembly may include: a first tray having a water storage space in which the condensate generated from the evaporator is stored; a second tray provided to receive the condensate from the first tray and to discharge the received condensate to the condenser; and a third tray provided below the condenser such that the condensate passing through the condenser is collected.

Further, the first tray may be formed below the evaporator such that one side thereof directed to the evaporator has the shape of an open water conduit, and may be provided such that the condensate generated by the heat exchange between the evaporator and the air introduced from an outside is collected on the first tray. The second tray may be disposed above the condenser, and be provided to have a supply space in which the condensate delivered from the first tray is stored. The third tray may be provided to have a discharge space such that the condensate passing through the condenser is collected.

Further, the air conditioner may further include an auxiliary member provided between the second tray and the condenser such that the condensate discharged from the second tray is uniformly supplied to the condenser.

Here, the auxiliary member may be provided to cover an upper portion of the condenser, and be provided between the condenser and the second tray under pressure so as to be able to smoothly discharge the condensate to the condenser.

Further, the air conditioner may further include a handle provided at an upper portion of the main body so as to allow the air conditioner to move, and the condenser and the evaporator may have the center of gravity disposed below the handle.

Further, the air conditioner may further include: a first ventilation fan that is provided in the first space and is disposed between the first discharge port and the evaporator; and a second ventilation fan that is provided in the second space and is disposed between the second discharge port and the condenser. The first discharge port, the first ventilation fan, the evaporator, and the first suction port may be disposed in a row in a forward/backward direction of the housing, and the second discharge port, the second ventilation fan, the condenser, and the second suction port may be disposed in a row in the forward/backward direction of the housing.

Here, the first and second discharge ports may be disposed in opposite directions in a forward/backward direction of the housing.

Further, the first space may include an evaporation channel extending from the first suction port to the first discharge port, and the second space may include a condensation channel extending from the second suction port to the second discharge port. The evaporation channel and the condensation channel may extend in opposite directions.

Further, the condenser may be disposed below the evaporator so as to be spaced apart from each other at a given angle in a leftward/rightward direction of the housing.

The air conditioner may include a control unit that is disposed in the second space and is provided for electrical control of the air conditioner. The second space may include a condensation channel extending from the second suction port, into which air is introduced from an outside, to the second discharge port to which the air in the second space is discharged. The condensation channel may include a first condensation channel that passes through the second suction port, the condenser, the second ventilation fan, and the second discharge port, and a second condensation channel that passes through the second suction port, the control unit, the second ventilation fan, and the second discharge port.

According to another aspect of the present disclosure, there is provided a method of controlling an air conditioner including a compressor, a condenser, an expansion unit, and an evaporator, the method including: operating a first ventilation fan that discharges air around the evaporator and a second ventilation fan whose rotational speed cooperates with that of the first ventilation fan in order to discharge air around the condenser at a preset air volume; and variably controlling an operating frequency of the compressor according to an air volume of the first ventilation fan such that power input of the compressor is equal to or less than a preset value.

Here, the method of controlling the air conditioner may include providing multiple setting air volumes so as to operate the first ventilation fan at different air volumes, and previously setting characteristic operating frequencies so as to correspond to the respective multiple setting air volumes.

Further, the method of controlling the air conditioner may further include causing the air volume of the first ventilation fan to be set by selection of a user.

According to yet another aspect of the present disclosure, there is provided a method of controlling an air conditioner including a compressor, a condenser, an expansion unit, and an evaporator, the method including: operating a first ventilation fan that discharges air around the evaporator and a second ventilation fan whose rotational speed cooperates with that of the first ventilation fan in order to discharge air around the condenser at a preset air volume; operating the compressor at an operating frequency corresponding to an air volume of the first ventilation fan; monitoring whether the air volume of the first ventilation fan is changed; and resetting the operating frequency of the compressor according to a change in the air volume of the first ventilation fan when the air volume of the first ventilation fan is changed.

Here, the method may include: providing multiple setting air volumes so as to operate the first ventilation fan at different air volumes; and previously setting characteristic operating frequencies so as to correspond to the respective multiple setting air volumes.

Further, the operating frequency corresponding to the air volume of the first ventilation fan may be set so that power input of the compressor is equal to or less than a preset value when the compressor is operated at an operating frequency corresponding to the setting air volume.

Further, the method may further include causing the air volume of the first ventilation fan to be set by selection of a user.

Further, the air volume of the first ventilation fan may be changed in such a manner that an actual air volume of the first ventilation fan is changed in a state in which setting of the air volume is not changed.

Also, the change in the air volume of the first ventilation fan may be detected by a change in discharge temperature of the compressor.

Further, when the discharge temperature of the compressor is lowered, it may be determined that the power input of the compressor is increased. When the discharge temperature of the compressor is raised, it may be determined that the power input of the compressor is reduced.

According to still yet another aspect of the present disclosure, there is provided a method of controlling an air conditioner equipped with multiple power consumption components including a first ventilation fan that discharges air around an evaporator and a second ventilation fan whose rotational speed cooperates with that of the first ventilation fan in order to discharge air around a condenser, the method including: invariably operating the first ventilation fan at a preset air volume; and variably controlling operating factors of the power consumption components other than the first and second ventilation fans among the multiple power consumption components such that a power consumption amount of the air conditioner is equal to or less than a preset value.

Here, the multiple power consumption components may include a variable capacity compressor.

Further, the variably controlling of the operating factors of the power consumption components may include variably controlling an operating frequency of the compressor.

Further, the method may further include: providing multiple setting air volumes so as to operate the first ventilation fan at different air volumes; and previously setting characteristic operating frequencies so as to correspond to the respective multiple setting air volumes.

Further, the characteristic operating frequencies may be set so that power input of the compressor is equal to or less than a preset value when the compressor is operated at an operating frequency corresponding to the setting air volume.

Also, the method may further include causing the air volume of the first ventilation fan to be set by selection of a user.

According to still yet another aspect of the present disclosure, there is provided an air conditioner, which includes: a compressor; a condenser; an expansion unit; an evaporator; a first ventilation fan that sends air of the evaporator; and a control unit that operates the first ventilation fan that discharges air around the evaporator and a second ventilation fan whose rotational speed cooperates with that of the first ventilation fan in order to discharge air around the condenser at a preset air volume, and variably controls an operating frequency of the compressor according to an air volume of the first ventilation fan such that power input of the compressor is equal to or less than a preset value.

Here, the air conditioner may include multiple setting air volumes provided to operate the first ventilation fan at different air volumes, and characteristic operating frequencies previously set to correspond to the respective multiple setting air volumes.

Further, the characteristic operating frequencies may be set so that power input of the compressor is equal to or less than a preset value when the compressor is operated at an operating frequency corresponding to the setting air volume.

In addition, the air conditioner may further include an air volume setting unit provided such that a user sets the air volume of the first ventilation fan. The air volume of the first ventilation fan may be set by selection of the user from the air volume setting unit.

According to an aspect of the present disclosure, there is provided a method of controlling an air conditioner including a compressor, a condenser, an expansion unit, and an evaporator includes: controlling a ventilation fan for sending air to the evaporator; and changing an operating frequency of the compressor according to intensity of the ventilation fan such that power input of the air conditioner is constant.

According to an aspect of the present disclosure, an air conditioner may include a housing comprising a first space in which a first suction port and a first discharge port are formed, and a second space in which a second suction port and a second discharge port are formed and a partition that prevents air in the first space from being interchanged with air in the second space, wherein the first space is configured to include just components that function as an indoor unit of the air conditioner and the second space is configured to include just components that function as an outdoor unit of the air conditioner.

BRIEF DESCRIPTION OF THE DRAWINGS

These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of embodiments, taken in conjunction with the accompanying drawings of which:

FIGS. **1**A and **1**B are perspective views of an air conditioner according to an embodiment of the present disclosure;

FIG. **2**A is an exploded perspective view of the air conditioner according to an embodiment of the present disclosure;

FIG. **2**B is a cross-sectional view taken along line A-A' of FIG. **1**A;

FIG. **3** is a perspective view illustrating blades according to an embodiment of the present disclosure;

FIG. **4** is a plan view of some components of the air conditioner according to an embodiment of the present disclosure;

FIG. **5** is a perspective view of some components of the air conditioner according to an embodiment of the present disclosure;

FIG. **6** is an exploded perspective view of some components of a second space in the air conditioner according to an embodiment of the present disclosure;

FIG. **7** is a perspective view of some components of the air conditioner according to an embodiment of the present disclosure;

FIG. **8** is an exploded perspective view of a tray assembly, an insertion case, and a water tank in the air conditioner according to an embodiment of the present disclosure;

FIG. **9** is a view of a flow of a condensate at an auxiliary member of the air conditioner according to an embodiment of the present disclosure;

FIG. **10** is a perspective view of an interior of the water tank in the air conditioner according to an embodiment of the present disclosure;

FIG. **11** is an exploded perspective view of the water tank and a base in the air conditioner according to an embodiment of the present disclosure;

FIGS. **12**A and **12**B are views of separating and inserting operations of the water tank in the air conditioner according to an embodiment of the present disclosure;

FIG. **13**A is a perspective view of a latch unit according to an embodiment of the present disclosure;

FIG. **13**B is a cross-sectional view taken along line B-B' of FIG. **13**A;

FIG. **13**C is a cross-sectional view taken along line C-C' of FIG. **13**A;

FIG. **14** is a view of coupling of the water tank in the air conditioner according to an embodiment of the present disclosure;

FIG. **15** is a view of a water level sensor of the water tank in the air conditioner according to an embodiment of the present disclosure;

FIGS. **16**A and **16**B are views of the base and a movement sensing unit according to an embodiment of the present disclosure;

FIGS. **17**A and **17**B are views of an operation of the movement sensing unit according to an embodiment of the present disclosure;

FIG. **18** is a graph of a relation between power consumption, ventilation intensity, and an operating frequency of a compressor in the air conditioner according to an embodiment of the present disclosure;

FIG. **19** is a graph of a relation between a discharge temperature at a first discharge port, ventilation intensity, and an operating frequency of a compressor in the air conditioner according to an embodiment of the present disclosure;

FIG. **20** is a view illustrating a control system of the air conditioner according to an embodiment of the present disclosure;

FIG. **21** is a view illustrating a first embodiment of a control method of the air conditioner according to an embodiment of the present disclosure;

FIG. **22** is a view illustrating another control system of the air conditioner according to an embodiment of the present disclosure;

FIG. **23** is a view for describing a concept of power consumption control using a discharge temperature of the compressor in the air conditioner according to an embodiment of the present disclosure; and

FIG. **24** is a view illustrating a second embodiment of a control method of the air conditioner according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

Reference will now be made in detail to embodiments of the present disclosure with reference to the accompanying drawings.

FIGS. **1**A and **1**B are perspective views of an air conditioner according to an embodiment of the present disclosure. FIG. **2**A is an exploded perspective view of the air conditioner according to an embodiment of the present disclosure, and FIG. **2**B is a cross-sectional view taken along line A-A' of FIG. **1**A.

A housing **10** is provided to form an external appearance of an air conditioner **1**.

The housing **10** includes left and right side panels **11** and **12** forming left and right sides. The housing **10** may be provided with a handle **18** so as to be able to move the air conditioner **1**. The handle **18** may be disposed to cross an upper middle of the housing **10** such that the air conditioner **1** can be moved without being inclined. That is, the handle **18** may be provided to be located above the center of gravity of the air conditioner **1**. The center of gravity of the air conditioner **1** may be provided to pass along a center line C, and the handle **18** may be disposed on the center line C. The housing **10** is provided with a base **13** at a lower portion thereof such that the air conditioner **1** can be supported from the floor.

The housing **10** may include suction ports **102** and **202** into which air is introduced from the outside, and discharge ports **104** and **204** through which the air inside the housing **10** is discharged.

An interior of the housing **10** may be partitioned into a first space **100** and a second space **200**. The first space **100** can be designated as an evaporation space because an evaporator (heat exchanger) **50** is disposed therein, and the second space **200** can be designated as a condensation space because a condenser (heat exchanger) **30** is disposed therein. The first space **100** and the second space **200** may be partitioned, such as by a partition **60**. The air in the first space **100** can be prevented from being interchanged with the air in the second space **200** by the partition **60**. In detail, the partition **60** may be provided to seal a lower portion of the first space **100** and an upper portion of the second space **200** from each other.

The first space **100** is disposed for components that function as an indoor unit in the split air conditioner **1**. The evaporator **50** and a first ventilation fan **122** may be disposed in the first space **100**. The second space **200** is disposed for components that function as an outdoor unit in the split air conditioner **1**. The condenser **30** and a second ventilation fan **222** may be disposed in the second space **200**. However, the present disclosure is not limited to such disposition, and such disposition may be changed. For example, a flow of a refrigerant may be changed such that the first space **100** is disposed for the function of the outdoor unit and the second space **200** is disposed for the function of the indoor unit.

The housing **10** is provided with a first suction port **102** which communicates with the first space **100** and into which the external air is introduced, and a first discharge port **104** through which the air in the first space **100** is discharged. Further, the housing **10** may be provided with a second suction port **202** which communicates with the second space **200** and into which the external air is introduced, and a second discharge port **204** through which the air in the second space **200** is discharged.

Each of the first suction port **102**, the first discharge port **104**, the second suction port **202**, and the second discharge port **204** may be provided with a guide **15** for guiding inflow and outflow of the air. The guides **15** are provided for the first and second suction ports **102** and **202**, and the first and second discharge ports **104** and **204** so that they can guide the inflow and outflow of the air and prevent foreign materials from being introduced from the outside into the housing **10**.

The first and second suction ports **102** and **202** may be respectively provided with filter members **106** and **206** so as to prevent the foreign materials from being introduced into the housing **10**. The filter members **106** and **206** are provided for the first and second suction ports **102** and **202** so as to be able to filter the foreign materials in the air introduced into the housing **10**.

In detail, the filter members **106** and **206** may include a first filter member **106** disposed at the first suction port **102**, and a second filter member **206** disposed at the second suction port **202**. First and second guide covers **107** and **207** may be respectively disposed outside the first and second filter members **106** and **206** such that the first and second filter members **106** and **206** are not exposed to the outside. In detail, the first filter member **106** may be disposed and fixed between the first guide cover **107** and the guide **15**, and the second filter member **206** may be disposed and fixed between the second guide cover **207** and the guide **15**.

The first suction port **102**, the evaporator **50**, the first ventilation fan **122**, and the first discharge port **104** may be disposed in the first space **100** disposed at an upper portion of the housing **10** in a row, that is, disposed on the same horizontal line within the first space **100**. Further, the second suction port **202**, the condenser **30**, the second ventilation fan **222**, and the second discharge port **204** may be disposed in the second space **200** disposed at the lower portion of the housing **10** in a row, that is, on the same horizontal line. This disposition simplifies a channel structure to allow air resistance to be reduced during movement of the air.

The first discharge port **104** and the second discharge port **204** may be provided to be disposed in opposite directions. The air passing through the evaporator **50** is discharged through the first discharge port **104**, and the air passing through the condenser **30** is discharged through the second discharge port **204**. As such, the first and second discharge ports **104** and **204** are disposed in the opposite directions such that flows of the discharged air will not be mixed in a discharge process.

A compressor **20**, a heat exchanger, and an expansion unit **40** may be disposed in the housing **10**. The heat exchanger may include the condenser **30** and the evaporator **50**.

The compressor **20** compresses and discharges the refrigerant in a high-temperature high-pressure state, and the compressed refrigerant is introduced into the condenser **30**. In the condenser **30**, the refrigerant compressed by the compressor **20** is condensed to a liquid phase. Heat is given off to the surroundings in the condensation process.

The expansion unit **40** expands the high-temperature high-pressure liquid refrigerant condensed by the condenser **30** to a low-pressure liquid refrigerant. The evaporator **50** functions to return a low-temperature low-pressure refrigerant gas to the compressor **20** while evaporating the refrigerant expanded by the expansion unit **40**, thereby producing a refrigeration effect by heat exchange with a cooling target using the latent heat of evaporation of the refrigerant. A temperature of the air in the indoor space can be controlled through repetition of this cycle.

The expansion unit **40** has various types. However, in an embodiment of the present disclosure, the expansion unit **40** may be formed of a capillary tube. Further, the expansion unit **40** may be provided to pass through the partition **60** provided between the first space **100** and the second space **200**.

A first case **110** may be provided in the first space **100**.

The first case **110** is configured in such a manner that a first inflow opening **112** is formed at one side thereof so as to be covered by the evaporator **50** and a first outflow opening **114** is formed at the other side thereof. The first ventilation fan **122** (to be described below) is disposed in the first case **110**. The first case **110** includes a first ventilation guide **120** so as to form a channel of the first ventilation fan **122**.

The first inflow opening **112** is provided to be covered by the evaporator **50**, and is disposed such that all the air introduced into the first ventilation fan **122** passes through the evaporator **50**. With this configuration, heat exchange efficiency of the evaporator **50** can be improved. The air introduced from the first suction port **102** is introduced to the first ventilation fan **122** via the evaporator **50** and the first inflow opening **112**, and is discharged from the first ventilation fan **122** to the outside via the first outflow opening **114** and the first discharge port **104**. A channel along which the air flows from the first suction port **102** to the first discharge port **104** can be defined as an evaporation channel PE.

A second case **210** may be provided in the second space **200**.

The second case **210** is configured in such a manner that a second inflow opening **212** is formed at one side thereof so as to be covered by the condenser **30** and a second outflow opening **214** is formed at the other side thereof. The second ventilation fan **222** (to be described below) is disposed in the second case **210**. The second case **210** includes a second ventilation guide **220** so as to form a channel of the second ventilation fan **222**.

The second inflow opening **212** is provided to be covered by the condenser **30**, and is disposed such that most of the air introduced into the second ventilation fan **222** passes through the condenser **30**. With this configuration, heat exchange efficiency of the condenser **30** can be improved. A control unit **70** of the air conditioner **1** may be disposed in the second case **210**. The control unit **70** is provided to be covered by a control unit cover **71**, and may be provided with an air inflow hole **76** so as to form a second condensation channel PC**2** to be described below.

A ventilation fan may include the first ventilation fan **122** provided for the first space **100**, and the second ventilation fan **222** provided for the second space **200**. The first ventilation fan **122** is disposed between the first suction port **102** and the first discharge port **104**, and guides the air introduced from the first suction port **102** so as to be able to pass through the evaporator **50** to be discharged to the first discharge port **104**. The second ventilation fan **222** is disposed between the second suction port **202** and the second discharge port **204**, and guides the air introduced from the second suction port **202** so as to be able to pass through the condenser **30** to be discharged to the second discharge port **204**.

The first ventilation fan **122** and the second ventilation fan **222** are respectively disposed inside the first ventilation guide **120** and the second ventilation guide **220**. The flows of the air discharged from the ventilation fans **122** and **222** are guided by the ventilation guides **120** and **220**. Thus, the ventilation guides **120** and **220** guide the flows of the discharged air so as to be able to be discharged to the first discharge port **104** and the second discharge port **204**.

The first ventilation fan **122** and the second ventilation fan **222** may be driven by a first driver **124** and a second driver **224**, respectively. With this configuration, the first ventilation fan **122** and the second ventilation fan **222** can be independently driven. The driving may vary depending on an operating environment of the air conditioner **1** or a set temperature of the air conditioner **1**. The first driver **124** or the second driver **224** is operated by an electric signal received from the control unit **70**. For example, the first driver **124** or the second driver **224** may include a motor.

A type of the first ventilation fan **122** or the second ventilation fan **222** is not limited. In an embodiment, a centrifugal fan may be applied by way of example. However, the ventilation fans **122** and **222** are not limited to such a centrifugal fan.

FIG. **3** is a perspective view illustrating blades according to an embodiment of the present disclosure.

In FIG. **3**, the first outflow opening **114** of the first case **110** is illustrated with no guide **15** mounted on the air conditioner **1**.

The first ventilation guide **120** may be provided with blades **140** for guiding the air that is discharged through the first ventilation fan **122** past the first outflow opening **114** to the outside of the housing **10**.

The blades **140** may include horizontal blades **142** for guiding an upward/downward direction of the discharged air, and vertical blades **146** for guiding a leftward/rightward direction of the discharged air. The blades **140** may be provided inside the guide **15** so as not to be directly exposed to the outside.

The blades **140** may be electrically controlled by at least one motor, or may be controlled by a separate control handle **144**. In an embodiment of the present disclosure, a plurality of horizontal blades **142** may be provided to be coupled to a horizontal pivoting connector **143** so as to be directed in the same direction and to be inclined upward/downward by the control handle **144** provided for any one of the plurality of horizontal blades **142**. The control handle **144** is provided to be exposed to the outside across the guide **15** so as to be able to vertically control the control handle **144** from the outside.

Further, a plurality of vertical blades **146** may be provided to be coupled to a vertical pivoting connector **147** so as to be directed in the same direction and to be inclined leftward/rightward by a blade driver **148** provided for any one of the plurality of vertical blades **146**. With this configuration, a direction in which the air is discharged through the first discharge port **104** can be controlled.

FIG. **4** is a plan view of some components of the air conditioner according to an embodiment of the present disclosure, and FIG. **5** is a perspective view of some components of the air conditioner according to an embodiment of the present disclosure.

Each of the heat exchangers **30** and **50** and the ventilation fans **122** and **222** may be disposed such that the center of gravity thereof is located in the middle of the air conditioner **1**. In detail, assuming that a vertical extension line from the middle of the handle **18** in a downward direction or in a direction directed to the base is a center line C, each of the heat exchangers **30** and **50** and the ventilation fans **122** and **222** may be provided such that the center of gravity thereof passes through the center line C.

To be specific, the evaporator **50** and the condenser **30** are disposed across the partition **60** on upper and lower sides so as to be spaced apart from each other at a given angle, and may be disposed such that the centers of gravity thereof pass the center line C. Further, the first ventilation fan **122** and the second ventilation fan **222** are disposed across the partition **60** on upper and lower sides. The first ventilation fan **122** and the second ventilation fan **222** may be disposed such that the centers of gravity thereof pass through the center line C.

The condenser **30** receives ambient heat from the gaseous refrigerant passing through the compressor **20**, and absorbs both sensible heat and latent heat of the refrigerant itself to condense the refrigerant. The evaporator **50** absorbs only the latent heat of evaporation from the same flow rate of refrigerant in theory, and evaporates the refrigerant to absorb ambient heat. As such, the condenser **30** may be disposed to have a wider area than the evaporator **50**.

In the present embodiment, the condenser **30** is disposed to have a wider area than the evaporator **50**, and the heat exchangers are disposed such that the center of gravity therebetween is adjacent to the center line C. To make the air conditioner **1** smaller, the condenser **30** is disposed to be inclined with respect to the evaporator **50** at a given angle. That is, the condenser **30** and the evaporator **50** are disposed to be spaced apart from each other at a given angle. Thereby, it is possible to increase spatial efficiency of the internal space of the air conditioner **1**.

FIG. **6** is an exploded perspective view of some components of the second space in the air conditioner according to an embodiment of the present disclosure.

The second case **210**, the condenser **30**, the compressor **20**, the second ventilation fan **222**, and the second ventilation guide **220** may be disposed in the second space **200**.

The control unit **70** for the operation of the air conditioner **1** may be provided on one side of the second case **210**. In the present embodiment, the control unit **70** may be disposed at an upper portion of the second case **210**.

The second space **200** may include a first condensation channel PC**1** along which the air passes through the second suction port **202**, the condenser **30**, and the second ventilation fan **222** and is discharged to the second outflow opening **214** and the second discharge port **204**, and a second condensation channel PC**2** along which the air passes through the second suction port **202**, the control unit **70**, and the second ventilation fan **222** and is discharged to the second outflow opening **214** and the second discharge port **204**.

The air introduced from the second suction port **202** is distributed to flow to the first condensation channel PC**1** and the second condensation channel PC**2**, and exchanges heat with the condenser **30** while passing along the first condensation channel PC**1** and to cause heat to be released from the control unit **70** while passing along the second condensation channel PC**2**.

In detail, one side of the control unit **70** is formed with the air inflow hole **76** such that part of the air introduced into the second suction port **202** can be introduced, and the other side of the control unit **70** is provided to communicate with the internal space of the second case **210** having the second ventilation fan **222** and the second ventilation guide **220**.

If a flow rate of the air passing along the second condensation channel PC**2** is more than that of the air passing along the first condensation channel PC**1**, the heat exchange efficiency of the condenser **30** is reduced, and thus the air inflow hole **76** formed on the second condensation channel PC**2** may be formed smaller than a width of the condenser **30**.

In detail, the air inflow hole **76** may be formed at such a size as to dissipate heat of a circuit board **72** of the control unit **70** and heat of a heat sink **74** mounted on the circuit board **72**.

FIG. **7** is a perspective view of some components of the air conditioner according to an embodiment of the present disclosure. FIG. **8** is an exploded perspective view of a tray assembly, an insertion case, and a water tank in the air conditioner according to an embodiment of the present disclosure. FIG. **9** is a view of a flow of a condensate at an auxiliary member of the air conditioner according to an embodiment of the present disclosure.

The air conditioner **1** is provided to be able to operate in a cooling mode and in a dehumidifying mode. In the cooling mode, the refrigerant circulates through the compressor **20**, the condenser **30**, the expansion unit **40**, and the evaporator **50**, and cooled air is discharged out of the air conditioner **1** by heat exchange between the evaporator **50** and the external or indoor air. In the dehumidifying mode, a condensate generated on a surface of the evaporator **50** due to a flow of the refrigerant and inflow and outflow of the external air in the cooling mode is removed, thereby removing moisture in the air.

The tray assembly **300** is provided to operate the cooling mode and the dehumidifying mode.

In detail, in the cooling mode, the condensate generated from the evaporator **50** is discharged to the condenser **30** so as to improve the heat exchange efficiency of the condenser **30**. Further, in the dehumidifying mode, the condensate generated from the evaporator **50** is discharged to the water tank **450** in which the condensate is stored so as to remove the moisture in the air.

The water tank **450** is provided to collect the condensate generated from the evaporator **50**. The water tank **450** is not limited to this disposition or shape. In an embodiment of the present disclosure, the water tank **450** is formed in the shape of a cassette, and is provided to be separable from the housing **10** at the lower portion of the housing **10**.

The tray assembly **300** may include a first tray **310** and a second tray **320**.

The first tray **310** is provided with a water storage space **310*a*** in which the condensate generated from the evaporator **50** is stored. The second tray **320** is provided to receive the condensate from the first tray **310** and discharge it to the condenser **30**.

The first tray **310** is formed below the evaporator **50** such that one side thereof directed to the evaporator **50** has the shape of an open water conduit. Thereby, the condensate generated by the heat exchange between the evaporator **50** and the air introduced from the outside can be collected on the first tray **310**.

The first tray **310** may be disposed, as an independent component, below the evaporator **50**. In the present embodiment, the first tray **310** is formed to extend from the partition **60**, to collect the condensate generated from the evaporator **50** and simultaneously to partition the housing into the first space **100** and the second space **200** as a part of the partition **60**.

The first tray **310** may include a first tray bottom **312** formed to face a lower portion of the evaporator **50**, and a first tray flange **314** formed to extend upward from an end of the first tray bottom **312**.

The first tray bottom **312** is provided with a drain hole **312*a*** so as to be able to supply the condensate to the second tray **320**. The first tray bottom **312** may be formed to be inclined toward the drain hole **312*a*** such that the condensate, which falls from the evaporator **50** and is collected on the first tray **310**, can be smoothly discharged through the drain hole **312*a***. The first tray bottom **312** is formed to be equal to or greater than a width of the lower portion of the evaporator **50**, and can prevent the condensate generated from the evaporator **50** from falling outside the first tray **310** and contaminating the internal space of the air conditioner **1**.

The second tray **320** is provided to receive the condensate from the first tray **310** and to discharge it to the condenser **30**.

The second tray **320** is disposed above the condenser **30**, and may be formed to extend in a lengthwise direction of the condenser **30**. The second tray **320** is provided with a supply space **320*a*** in which the condensate delivered from the first tray **310** is stored so as to be able to supply the condensate to the condenser **30** on the whole.

The second tray **320** may include a second tray bottom **322** formed to correspond to an upper portion of the condenser **30**, and a second tray flange **324** formed to extend upward from an end of the second tray bottom **322**.

The second tray bottom **322** is provided with at least one supply hole **322*a***. The supply holes **322*a*** are disposed apart from each other so as to correspond to an upper shape of the condenser **30**. The condensate generated from the evaporator **50** is supplied to the condenser **30** via the supply hole **322*a***, and wets a surface of the condenser **30**. Thereby, it is possible to improve the heat exchange efficiency of the condenser **30**.

The second tray bottom **322** is formed to be parallel with the lower portion of the condenser **30**. Further, the second tray bottom **322** may be provided to be inclined in a direction directed to the end of the second tray bottom **322** such that the condensate generated from the evaporator **50** can be smoothly discharged through the supply hole **322*a***. The at least one supply hole **322*a*** may be disposed in a lengthwise direction of the second tray bottom **322**.

In detail, the multiple supply holes **322*a*** are disposed at intervals in the lengthwise direction of the second tray bottom **322**. The second tray bottom **322** may be provided such that the condensate discharged from the first tray **310** through the drain hole **312*a*** is uniformly supplied to the multiple supply holes **322*a*** and such that the supply hole **322*a*** disposed downstream on a traveling path of the condensate flowing into the second tray bottom **322** is located at a lower position than the supply hole **322***a* disposed upstream.

The second tray bottom **322** is formed to correspond to a width of the upper portion of the condenser **30**, and can prevent the condensate generated from the evaporator **50** from falling beyond the condenser **30** to contaminate the internal space of the air conditioner **1**.

The second tray **320** may include a supply guide **326** for guiding the condensate from the drain hole **312***a* of the first tray **310** to the supply space **320***a* of the second tray **320**. The supply guide **326** is formed to extend from the second tray **320**, and may be integrally formed with the second tray **320**. An end of the supply guide **326** is formed to pass below the drain hole **312***a* of the first tray **310**, and forms a movement channel such that the condensate discharged to the drain hole **312***a* is guided to the supply space **320***a* of the second tray **320**.

The second tray **320** may include a spread rib **322***b* that is provided on the second tray bottom **322** and is disposed upstream relative to the supply hole **322***a* on the movement path of the condensate. The spread rib **322***b* may be disposed upstream relative to the supply holes **322***a* on the movement path of the condensate to prevent the condensate moving along the supply guide **326** from being concentrated on and introduced into a supply hole **324***a* adjacent to the supply guide **326** among the multiple supply holes **322***a*. The condensate is dispersed in the lengthwise direction of the second tray **320** by the spread rib **322***b*. Thereby, it is possible to more uniformly introduce the condensate into the multiple supply holes **322***a* so that no single hole acts as a bottleneck that reduces the flow of condensate.

An auxiliary member **340** may be provided between the second tray **320** and the condenser **30** such that the condensate discharged from the second tray **320** is uniformly supplied to the condenser **30**.

The auxiliary member **340** is provided such that the condensate discharged from at least one of the supply holes **322***a* of the second tray **320** can be uniformly dispersed and discharged to the upper portion of the condenser **30**. The auxiliary member **340** may have a porous structure, for instance a sponge structure.

The auxiliary member **340** is provided to cover the upper portion of the condenser **30**, and may be provided between the condenser **30** and the second tray **320** under pressure so as to be able to smoothly discharge the condensate to the condenser **30**.

The tray assembly **300** may further include a third tray **330**. The third tray **330** may be provided below the condenser **30** such that the condensate passing through the condenser **30** is collected. The third tray **330** is disposed below the condenser **30**, is formed to extend in the lengthwise direction of the condenser **30**, and is provided with a discharge space **330***a* such that the condensate passing through the condenser **30** may be collected.

The third tray **330** may include a third tray bottom **332** formed to correspond to a lower portion of the condenser **30**, and a third tray flange **334** formed to extend upward from an end of the third tray bottom **332**.

The third tray bottom **332** is provided with a discharge hole **332***a* so as to be able to discharge the condensate to the water tank **450**. The third tray bottom **332** may be formed to be inclined toward the discharge hole **332***a* such that the condensate, which falls from the condenser **30** and is collected on the third tray **330**, can be smoothly discharged through the discharge hole **332***a*. The third tray bottom **332** is formed to be equal to or greater than a width of the lower portion of the condenser **30**, and can prevent the condensate generated from the condenser **30** from falling outside the third tray **330** to contaminate the internal space of the air conditioner **1**.

The discharge hole **332***a* may be opened/closed by an opening/closing cap **350**. The opening/closing cap **350** is provided to move to a closing position **350***a* for closing the discharge hole **332***a* and an opening position **350***b* for opening the discharge hole **332***a*. The movement from the closing position **350***a* to the opening position **350***b* is performed by an opening protrusion **478** of the water tank **450** to be described below, and the movement from the opening position **350***b* to the closing position **350***a* may be performed by a dead load.

The third tray **330** may be disposed as an independent component. In an embodiment, the third tray **330** may be integrally formed with an insertion case **400** in which the water tank **450** (to be described below) is placed.

Hereinafter, operations of the air conditioner **1** according to the cooling mode and the dehumidifying mode will be described.

In the cooling mode, the condensate generated from the surface of the evaporator **50** is stored in the first tray **310**, and the condensate stored in the first tray **310** wets the surface of the condenser **30** through the supply hole **322***a* of the second tray **320**. Thereby, it is possible to improve the heat exchange efficiency of the condenser **30**.

In this case, the moisture in the air is converted into the condensate, and the condensate is evaporated on the surface of the condenser **30** again. As such, humidity of the external air can be nearly constantly maintained.

In the dehumidifying mode, the condensate generated from the surface of the evaporator **50** is stored in the first tray **310**, and the condensate stored in the first tray **310** is discharged to the water tank **450** by a bypass pipe (not shown) connecting the first tray **310** and the water tank **450**.

In this case, the moisture in the air is converted into the condensate, and the condensate is discharged to the water tank **450**. As such, the humidity of the external air is gradually reduced. That is, the moisture is removed in this process.

Hereinafter, the water tank of the air conditioner according to an embodiment of the present disclosure will be described.

FIG. **10** is a perspective view of an interior of the water tank in the air conditioner according to an embodiment of the present disclosure, and FIG. **11** is an exploded perspective view of the water tank and the base in the air conditioner according to an embodiment of the present disclosure.

The water tank **450** may be provided at the lower portion of the housing **10** such that the condensate generated according to the cooling mode or the dehumidifying mode of the air conditioner **1** can be stored.

The water tank **450** is removably provided in the air conditioner **1**, and is provide to be able to be put into or taken out of the insertion case **400** disposed at the lower portion of the housing **10**. To this end, an interior of the insertion case **400** is provided with a seating space **400***a* corresponding to a shape of the water tank **450** such that the water tank **450** can be placed.

The water tank **450** includes a storage case **460** having a storage space **460***a* in which the condensate is contained, and a case cover **470** provided at one side of the storage case **460**. The storage case **460** may be provided with an open upper surface, and the case cover **470** may be provided to open/close the open upper surface of the storage case **460**.

The case cover **470** may be provided with an inflow hole **472** so as to correspond to the discharge hole **332***a* of the third tray **330**. The inflow hole **472** is provided below the discharge hole **332***a* such that the condensate discharged through the discharge hole **332***a* is introduced into the water tank **450**. A width of the inflow hole **472** may be provided to correspond to that of the discharge hole **332***a*.

The case cover **470** may be provided with an inflow inclined plane **474** that is formed along a circumference of the inflow hole **472** and is formed to be inclined from the upper surface of the neighboring case cover **470** toward the inflow hole **472**. The inflow inclined plane **474** is formed along the circumference of the inflow hole **472**, and guides the condensate discharged from the discharge hole **332***a* such that the discharged condensate can be stably introduced into the inflow hole **472**.

The case cover **470** is provided with a guide tube **476** on an inner surface thereof which guides the condensate introduced through the inflow hole **472**. The guide tube **476** is formed in a rod shape, and has a guide hole **476***a* in an interior thereof communicating with the inflow hole **472**. The condensate introduced through the inflow hole **472** may be guided through the guide hole **476***a* of the guide tube **476** and may be introduced into the water tank **450**.

The guide tube **476** may be integrally formed with the case cover **470** on an inner side of the case cover **470**. An end of the guide tube **476** is spaced apart from the bottom of the storage case **460** such that the condensate discharged through the guide tube **476** can be stored in the storage case **460**.

Hereinafter, an operation of the opening/closing cap base on the insertion of the water tank according to an embodiment of the present disclosure will be described.

FIGS. **12**A and **12**B are views of separating and inserting operations of the water tank in the air conditioner according to an embodiment of the present disclosure.

The case cover **470** may be provided with an opening protrusion **478** disposed adjacent to the inflow hole **472** on an outside thereof. The opening protrusion **478** is provided to push out the opening/closing cap **350** of the discharge hole **332***a* so as to be able to move from the closing position **350***a* to the opening position **350***b*. The opening/closing cap **350** is operated by the opening protrusion **478**. Thereby, the discharge hole **332***a* is opened when the water tank **450** is inserted into the air conditioner **1**, and the discharge hole **332***a* is closed when the water tank **450** is separated from the air conditioner **1**.

As in FIG. **12**A, when the water tank **450** is inserted, the opening protrusion **478** pushes up the opening/closing cap **350**, and the opening/closing cap **350** moves from the closing position **350***a* to the opening position **350***b*. The opening/closing cap **350** has a cap pressing face **352** formed in an inclined manner such that the opening/closing cap **350** can move in a direction perpendicular to a direction in which the water tank **450** is inserted. The opening protrusion **478** presses the cap pressing face **352** while the water tank **450** is inserted into the seating space **400***a*, and the opening/closing cap **350** moves from the closing position **350***a* to the opening position **350***b* in an upward direction.

As in FIG. **12**B, when the water tank **450** is separated, the opening/closing cap **350** moves to the closing position **350***a* due to its dead load, closing the discharge hole **332***a*. When the discharge hole **332***a* is closed, the condensate falling from the condenser **30** to the third tray **330** is not discharged and is collected in the third tray **330**.

As the opening/closing cap **350** is operated by the opening protrusion **478** of the water tank **450**, it is possible to restrict the discharge of the condensate to prevent the interior of the air conditioner **1** from being contaminated when the water tank **450** is separated from the air conditioner **1**, and to guide the discharge of the condensate from the third tray **330** to the water tank **450** when the water tank **450** is inserted into the air conditioner **1**.

Hereinafter, separating and inserting processes of the water tank from and into the insertion case according to an embodiment of the present disclosure will be described.

FIG. **13**A is a perspective view of a latch unit according to an embodiment of the present disclosure. FIG. **13**B is a cross-sectional view taken along line B-B' of FIG. **13**A, and FIG. **13**C is a cross-sectional view taken along line C-C' of FIG. **13**A.

The insertion case **400** in which the water tank **450** is placed may be provided with a latch unit **410**.

The latch unit **410** is provided to be able to lock or unlock the water tank **450** when the water tank **450** is inserted into or separated from the insertion case **400**.

The water tank **450** is provided to be separable from the insertion case **400** in a push-and-push operation. Here, in a state in which the water tank **450** is locked by the latch unit **410**, when the water tank **450** is pushed, the water tank **450** is unlocked. In a state in which the water tank **450** is unlocked, when the water tank **450** is pushed, the water tank **450** is locked.

The latch unit **410** includes a latching protrusion **412** formed to protrude from the upper surface of the case cover **470** of the water tank **450**, and a latch **420** provided to catch or release the latching protrusion **412**.

The latch **420** is provided inside the insertion case **400** such that the water tank **450** is fixed to the insertion case **400**. The latching protrusion **412** is provided on the upper surface of the case cover **470** in a protruding shape. The latching protrusion **412** can be inserted into the latch **420**B.

The latch **420** may include a latch housing **422** fixed inside a fixing part, a slide member **424** reciprocating in the latch housing **422**, a spring **426** resiliently supporting the slide member **424**, a guide slot **428** provided for the slide member **424**, a guide bar **430** whose fixing end **430***a* is hinged to the latch housing **422** and whose movable end **430***b* is inserted into the guide slot **428** and guides or restricts the reciprocation of the slide member **424**, and a catch member **432** that is provided at an end of the slide member **424** and catches or releases the latching protrusion **412**. The catch member **432** is provided to be rotatable about its rotational shaft, and is rotated by advancing/retreating movement of the slide member **424**. The catch member **432** moves to a reception position **432***a* at which it is rotated to be able to receive the latching protrusion **412**, and a restraint position **432***b* at which it is rotated from the reception position **432***a* to catch the latching protrusion **412**.

The catch member **432** may be rotated from the reception position **432***a* to the restraint position **432***b* by a pressing face of the latch housing **422**, and from the restraint position **432***b* to the reception position **432***a* by a return spring **434**.

When the water tank **450** is pushed into the insertion case **400**, the latching protrusion **412** moves in a direction in which the water tank **450** is inserted. Then, the latching protrusion **412** pushes the slide member **424** in the inserting direction.

The slide member **424** overcomes an elastic force of a spring **426**, and moves in the inserting direction. Here, the movable end **430***b* of the guide bar **430** moves along the guide slot **428** in a direction of a dashed line A.

As a result, the movable end **430***b* of the guide bar **430** is supported by a supporting face **428***a* of the guide slot **428**, and thereby the movement of the slide member **424** is stopped. Here, the catch member **432** is rotated to be able to catch the latching protrusion **412**, and the water tank **450** is fixed. In detail, the catch member **432** is rotated from the reception position **432***a* to the restraint position **432***b* and restrains the latching protrusion **412** while the rotational shaft **433** thereof moves in the inserting direction along with the slide member **424** and one side thereof is pressed by the pressing face **422***a* of the latch housing **422**.

In this state, when the water tank **450** is pressed in the inserting direction again, the movable end **430***b* of the guide bar **430** moves along the guide slot **428** in a direction of a solid line B, and the catch member **432** returns to the original state. Thereby, the latching protrusion **412** caught by the catch member **432** is released, and the water tank **450** is unfixed to move in a separating direction. In detail, the rotational shaft **433** of the catch member **432** moves in the separating direction along with the slide member **424**, and the catch member **432** is rotated from the restraint position **432***b* to the reception position **432***a* by the return spring **434**, and releases the restraint of the latching protrusion **412**.

Meanwhile, a front surface of the water tank **450** may be provided with a push part **452** which a user can easily push.

Hereinafter, separating and coupling of the water tank and the insertion case according to an embodiment of the present disclosure will be described.

FIG. **14** is a view of coupling of the water tank in the air conditioner according to an embodiment of the present disclosure.

The case cover **470** is provided on the open upper surface of the storage case **460** so as to be removably coupled. One side of the case cover **470** is provided to be fitted into the storage case **460**, and the other side of the case cover **470** is provided to be hooked onto the storage case **460** by a hook member **480**.

In detail, the storage case **460** is provided with fitting noses **461** on one side thereof which correspond to the one side of the case cover **470** so as to be able to restrain the one side of the case cover **470**, and a fixing nose **462** on the other side thereof which corresponds to a hook member **480** of the case cover **470** so as to be able to restrain the other side of the case cover **470**.

The case cover **470** may be provided with the hook member **480** at one end thereof so as to be able to be hooked onto the fixing nose **462** of the storage case **460**. The hook member **480** releases restraint on the fixing nose **462** by an opening/closing member **464** to be described below. To be specific, when the open side of the storage case **460** is sealed by the case cover **470**, the hook member **480** is hooked onto the fixing nose **462** of the storage case **460** and thereby maintains a sealed state. When the one side of the storage case **460** is opened, the opening/closing member **464** is provided to separate the hook member **480** and the fixing nose **462** from each other.

The hook member **480** may include a hook member body **480***a* formed to extend from the case cover **470** along an outer lateral face of the storage case **460**, and a snap part **480***b* formed at an end of the hook member body **480***a* so as to protrude toward the storage case **460** to be hooked onto the fixing nose **462**. The hook member body **480***a* may be provided with a predetermined curvature so as to closely push the snap part **480***b* toward the storage case **460** without the snap part **480***b* easily separating from the fixing nose **462**. Further, the hook member body **480***a* is provided with elasticity so as to be able to separate the hook member **480** and the fixing nose **462** when the opening/closing member **464** is operated.

The opening/closing member **464** may include an opening/closing member body **465**, a pushing part **466**, an elastic return part **467**, and an unhooking part **469**.

The opening/closing member body **465** is provided to be slidable along an outer surface of the storage case **460**. The pushing part **466** is provided to receive an external force from the outside at the opening/closing member body **465**. The elastic return part **467** applies a force reacting against the external force such that the opening/closing member **464** pressed to slide by the pushing part **466** returns to its original position again. The elastic return part **467** may be formed of an elastic material in order to generate a force for returning to the original position. In the present embodiment, a spring is used by way of example. However, any component may be used if it can move the opening/closing member **464** to the original position. The elastic return part **467** may be disposed such that one end thereof is fixed to the storage case **460** and the other end thereof is fixed inside the opening/closing member body **465**.

The unhooking part **469** is provided at one side of the opening/closing member body **465**, comes into contact with the hook member **480** with the movement of the opening/closing member body **465**, and separates the hook member **480** from the fixing nose **462**.

Hereinafter, a water level sensor of the water tank according to an embodiment of the present disclosure will be described.

FIG. **15** is a view of a water level sensor of the water tank according to an embodiment of the present disclosure.

The storage case **460** may be provided therein with a water level sensor **490**.

The water level sensor **490** is provided to be able to detect an amount of the condensate in the storage case **460**. The water level sensor **490** is disposed inside the storage case **460**, is provided with buoyancy so as to be able to be separated from the bottom **460***b* of the storage case **460** by the condensate. The water level sensor **490** moves in a sensor movement space **492** due to the buoyancy depending on the amount of the condensate. The sensor movement space **492** is provided to communicate with the storage space **460***a* such that the condensate can flow into the sensor movement space **492**.

The storage case **460** may be provided with a sensor guide **494** for restraining leftward/rightward movement of the water level sensor **490** such that the water level sensor **490** can move in an upward/downward direction only. The sensor guide **494** serves as a partition between the storage space **460***a* and the sensor movement space **492** such that the water level sensor **490** does not depart from the sensor movement space **492** and the condensate can flow into the sensor movement space **492**. Further, a movement restrict **496** is provided on an upper side of the water level sensor **490** so as to restrain the water level sensor **490** from moving beyond a given height.

The base **13** may be provided with a sensor detector **498** so as to correspond to the water level sensor **490**. The sensor detector **498** may be provided with magnetism. When the water level sensor **490** floats due to the buoyancy of the condensate rising up in the storage case **460**, an amount of the condensate in the storage case **460** is detected due to a change in magnetic force between the water level sensor **490** and the sensor detector **498**. When the storage space **460***a* reaches a high water level, the sensor detector **498** sends an electric signal to the control unit **70** in order to stop the operation of the air conditioner **1** such that the condensate is no longer generated. Conversely, the water level sensor **490** may be provided with magnetism such that the sensor detector **498** detects a magnetic force. This will do if the water level of the storage space **460***a* can be detected.

Hereinafter, a configuration for sensing movement or operation of the air conditioner according to an embodiment of the present disclosure will be described.

FIGS. **16**A and **16**B are views of the base and a movement sensing unit according to an embodiment of the present disclosure, and FIGS. **17**A and **17**B are views of an operation of the movement sensing unit according to an embodiment of the present disclosure.

When the air conditioner **1** falls or moves to and stays at another place during the operation of the air conditioner **1**, the operation of the air conditioner **1** is restrained by the movement sensing unit **500**. This movement sensing unit **500** will be described in more detail below.

The base **13** has at least one anti-slip part **520** disposed to prevent the air conditioner **1** from sliding during operation. The anti-slip part **520** is formed to protrude downward from the base **13** so as to come into contact with the floor, and prevents the air conditioner **1** from sliding. The anti-slip part **520** is not limited to the layout and material described herein. In the present embodiment, the anti-slip parts **520** are formed of an elastic material, and are widely disposed along a circumference of the base **13** so as to stably support the air conditioner **1** from the floor.

The base **13** has at least one leg part **530** disposed to prevent the air conditioner **1** from falling during the operation. The leg part **530** is provided for the base **13** so as to come into contact with the floor. The leg part **530** is folded to be disposed on the bottom of the base **13** when not used, and is unfolded when used so as to stably support the air conditioner **1**. In an embodiment of the present disclosure, a pair of leg parts **530** are provided to be disposed in the leftward/rightward direction in which the air conditioner **1** is relatively narrower than in the forward/backward direction.

The base **13** may include the movement sensing unit **500**.

When the base **13** is separated from the floor, the movement sensing unit **500** detects this, and sends a signal to the control unit **70**. The operation of the air conditioner **1** is stopped by the control unit **70**.

The movement sensing unit **500** has a unit rotational shaft **512** in parallel with the bottom of the base **13** such that an end thereof can rotate in the upward/downward direction.

The movement sensing unit **500** includes a unit body **510** whose opposite ends are provided to move up and down relative to the unit rotational shaft **512**, a floor contact part **510***a* that is provided at one end of the unit body **510** so as to come into contact with the floor, and a switch operating part **510***b* that is provided at the other end of the unit body **510** and operates a microswitch **514**.

The base **13** includes a base cover **14** and a base body **115**. The base cover **14** is formed with a movement hole **14***a* such that the floor contact part **510***a* can move up and down. The movement sensing unit **500** is disposed between the base cover **14** and the base body **115**, and may be rotatably disposed at the base body **15**.

As in FIG. **17**A, the movement sensing unit **500** is provided to move to a normal position **500***a* at which, with the unit rotational shaft **512** used as a fulcrum, the floor contact part **510***a* is in contact with the floor, and the switch operating part **510***b* turns on the microswitch **514**. As in FIG. **17**B, the movement sensing unit **500** is provided to move to a detection position **500***b* at which, with the unit rotational shaft **512** used as a fulcrum, the floor contact part **510***a* is separated from the floor, and the switch operating part **510***b* turns off the microswitch **514**.

Hereinafter, a method of controlling the air conditioner according to an embodiment of the present disclosure will be described.

In general, the air conditioner **1** has a load determined by a difference between an actual indoor temperature and a setting temperature of a user in order to control a temperature in the entire indoor space. However, the air conditioner **1** in an embodiment of the present disclosure is provided similar to a personal air conditioner **1** such that cooled air or heated air is locally applied only to a part of an air-conditioning space, instead of cooling or heating the entire air-conditioning space. As such, a target air volume is set instead of setting a target temperature, and an operating frequency of the compressor **20** may be controlled to be suitable for the set target air volume. Thereby, the air conditioner **1** is operated with the same power input.

As the compressor **20** of the present disclosure, a capacity controlled compressor may be used. An example of the capacity controlled compressor may include, for instance, an inverter compressor. Even when all components have the same capability in a refrigeration cycle, a load may vary depending on an operating environment such as an ambient temperature, ambient conditions, and so on. When high load and much capability are required, the inverter compressor increases the operating frequency, which results in increasing the number of revolutions and the capability of the compressor **20**. In contrast, when the load is low, the inverter compressor reduces the operating frequency, which results in reducing the number of revolutions and the capability of the compressor **20**.

In general, if the operating frequency of the compressor **20** is increased with no change in the other components, the capability of the compressor **20** is increased, and power input is also increased. Further, if the air volume for the evaporator **50** is increased with no change of the other components, a temperature of the discharged air is increased, and cooling efficiency is reduced.

In the state in which the components of the refrigeration cycle are not changed, the power input is increased when a load is increased, whereas the power input is decreased when a load is decreased. The power input refers to the total power input that is consumed by all power consumption components constituting the air conditioner **1**. For example, the power input may include input that is consumed by the compressor **20**, the motor for the blower, and the control unit **70**. Especially, the power input of the compressor **20** accounts for a very high percentage of the total power input, and variation thereof is great. Thus, the power input of the compressor **20** is a most important factor that controls the power input of the air conditioner **1**.

Further, the power input of the compressor **20** increases in proportion to the operating frequency, but it has a great difference according to an operating pressure or temperature in spite of the same frequency. The operating pressure is determined by efficiency of the condenser **30**, and the efficiency of the condenser **30** varies according to an air volume of the second ventilation fan **222**. That is, when the air volume is reduced, the pressure is abruptly raised. In the result, the power input of the compressor **20** is increased when the operating frequency is high or when the air volume of the second ventilation fan **222** is small.

In the present disclosure, the capacity controlled inverter compressor is used as the compressor **20**, and the compressor **20**, the number of revolutions of which can be controlled, is used to enable a user to select a desired air volume of the air conditioner **1**. Further, a consumer is adapted to select only a desired air volume in order to improve the convenience of use from the viewpoint of a user who uses the air conditioner **1**. For example, when the user sets (or selects) the air volume, the compressor **20** is controlled to select and operate the number of revolutions of the compressor **20** in an optimum state according to the set air volume. That is, when the air volume is selected, then the compressor **20** is controlled such that the operating frequency thereof is changed. In the result, the air conditioner **1** is designed to be operated in a state in which the power input is approximately constant.

Further, in the present disclosure, a rotational speed of the first ventilation fan **122** for sending air around the evaporator **50** and a rotational speed of the second ventilation fan **222** for sending air around the first ventilation fan **122** and the condenser **30** cooperate with each other. To be more specific, the rotational speed (air volume) of the second ventilation fan **222** cooperates with the rotational speed (air volume) of the first ventilation fan **122**. Thus, when the user sets the air volume of the first ventilation fan **122** to obtain a desired air volume, the first ventilation fan **122** is rotated at the air volume set by the user, and thus the second ventilation fan **222** is also rotated at the same air volume as the first ventilation fan **122**. For example, if the air volume set by the user is high, the first ventilation fan **122** is rotated at a high speed and sends a strong wind, and the second ventilation fan **222** is also rotated at a high speed and sends a strong wind. In contrast, if the air volume set by the user is low, the first ventilation fan **122** is rotated at a relatively low speed and sends a weak wind, and the second ventilation fan **222** is also rotated at a relatively high speed and sends a weak wind.

Table 1 represents a relation between the air volume and the power input according to the change of the operating frequency. Table 1 is shown in a graph as in FIG. **18**. Items in the rows include wind intensities, and items in the columns include operating frequencies of a compressor.

TABLE 1

	Strong wind	Medium wind	Weak wind	Soft wind
30	69.0	76.6	80.0	86.1
34	88.7	87.9	92.7	101.3
37	94.9	95.0	103.0	113.2
40	105.0	108.0	112.7	124.7
47	120.0	127.0	135.6	151.8

It can be found that, for example, when the air conditioner is operated with the power input limited to 120 W, an increase in the operating frequency of the compressor **20** at the same air volume results in an increase in the power input. Further, it can be found that, when the air volume is low, the power input is increased compared to when the air volume is high. To sum up, when the operating frequency exceeds 39 Hz in the state of a very low air volume, the power input exceeds 120 W. When the operating frequency exceeds 46 Hz in the case of a high air volume, the power input exceeds 120 W.

Therefore, when a horizontal line is drawn rightwards at a point where the power input is 120 W, it has an intersection with a line according to each air volume. The operating frequency of the compressor **20** at this intersection is a necessary operating frequency of the compressor **20** at the corresponding air volume.

Table 2 represents a relation between the air volume and a temperature of air discharged from the first discharge port **104** depending on a change in operating frequency. Table 2 is shown in a graph as in FIG. **19**. Items of the transverse row are intensities of a wind, and items of the longitudinal column are operating frequencies of a compressor.

TABLE 2

	Strong wind	Medium wind	Weak wind	Soft wind
30	16.6	16.3	15.8	15.4
34	16.2	15.9	15.4	15.0
37	15.8	15.6	15.0	14.8
40	15.8	15.3	14.7	14.5
47	14.9	14.6	14.0	13.7

When the operating frequency of the compressor **20** is increased, the capability is increased. As such, if the air volume is the same, the temperature of the air discharged from the first discharge port **104** is lowered. Further, when the operating frequency of the compressor **20** is the same, and the air volume is increased, the temperature of the air discharged from the first discharge port **104** is increased.

In the result, when the compressor **20** is operated such that the power input is kept constant, the temperature of the air discharged from the first discharge port **104** can be always kept similar, and a deviation between the discharge temperatures according to operating conditions can be greatly reduced.

Further, when the compressor **20** is operated such that the power input is kept constant, the air conditioner **1** can be operated in a stable power supply-demand environment by restricting the actual total power input within limited conditions of the maximum power input required of the air conditioner **1**. Here, the limited conditions of the maximum power input may be either limited regulations of a power consumption amount or rated power of a power supply (i.e., rated power output to the air conditioner **1** at the power supply). As described above, since the power input of the compressor **20** accounts for the very high percentage of the total power input, and the variation thereof is very great, the power input of the compressor **20** is the most important factor that controls the power input of the air conditioner **1**. Thus, assuming that the power inputs of the power consumption components other than the compressor **20** have a fixed value that is small in change and intensity, the total power input of the air conditioner **1** can be constantly maintained only by keeping the power input of the compressor **20** constant. In constantly maintaining the total power input of the air conditioner **1**, it is natural to consider the power inputs of the power consumption components other than the compressor **20**.

When the compressor **20** is the inverter compressor, it is initially operated at an operating frequency of about 20 Hz. When the operating frequency reaches a set operating frequency while being gradually increased, the operating frequency is fixed. The compressor **20** is operated at the fixed operating frequency. This is intended to stably operate the compressor **20** because the compressor **20** may undergo an excessive load when the compressor **20** is operated at a high operating frequency from the beginning.

During the operation of the compressor **20**, when a temperature of a refrigerant discharged from the compressor **20** reaches 78° C., the operating frequency is fixed in this state without a further increase. If the temperature of the discharged refrigerant rises to 82° C. even in this state, the power input exceeds 120 W. As such, when the temperature of the discharged refrigerant arrives at 73° C., the operating frequency is reduced. In spite of an instruction to reduce the operating frequency, if the temperature of the refrigerant discharged from the compressor **20** continues to rise to 87° C. without a drop, the compressor **20** is stopped. When the compressor **20** is stopped, all functions are stopped, and the operation is restarted from the beginning. This may occur when the indoor temperature is raised beyond an allowed range, when the filter members **106** and **206** are covered in dust to reduce the air volume, or when the first and second discharge ports **104** and **204** are clogged to reduce the air volume.

To sum up, as shown in Table 3 below, when the set air volumes are "high," "medium," "low," and "very low," if the operating frequencies of the compressor **20** are set to 47, 40, 37, and 34, the power inputs are 120 W, 108.0 W, 103.0 W, and 101.3 W. It can be found that the power inputs are maintained at 120 W or less. From the viewpoint of the temperature of the discharged air, it can be found that, when the set air volumes are "high," "medium," "low," and "very low," the operating frequencies of the compressor **20** are set to 47, 40, 37, and 34, and thereby the temperatures of the discharged air are 14.9° C., 15.3° C., 15.0° C., and 15.0° C. and are maintained almost constant. In the result, the power input is stably maintained within the limited intensity (e.g., 120 W) while the air volume set by the user are maintained with no change, and the temperature of the discharged air can also be kept constant with no change.

TABLE 3

	Strong wind	Medium wind	Weak wind	Soft wind
30				
34				101.3
37			103.0	
40		108.0		
47	120.0			

TABLE 4

	Strong wind	Medium wind	Weak wind	Soft wind
30				
34				15.0
37			15.0	
40		15.3		
47	14.9			

FIG. **20** is a view illustrating a control system of the air conditioner according to an embodiment of the present disclosure. As illustrated in FIG. **20**, alternating current (AC) power supplied from an AC power supply **2002** is converted into a direct current (DC) by a DC power supply **2004**, and then is supplied to the air conditioner **1**. The DC power supply **2004** may be a DC adaptor acting as a separate device independent of the air conditioner **1**.

In the air conditioner **1**, a voltage distributing unit **2006** converts a voltage (e.g., 12 V or 24 V) output from the DC power supply **2004** into various voltages required from respective components of the air conditioner **1**, and supplies the converted voltages. For example, the compressor **20**, the first ventilation fan **122**, and the second ventilation fan **222** can be supplied with 12 V or 24 V with no change, but the control unit **70**, the input unit **2010**, and the movement sensing unit **500**, all of which require high voltage, can be supplied with 5 V or 3.3 V that is relatively low voltage.

The input unit **2010** may include a power button **2012** and an air volume setting unit **2014**. The power button **2012** is intended to enable a user to carry out on/off control of the air conditioner **1**. When the power button **2012** is turned on, the air conditioner **1** is initialized in an operable state while being supplied with the power. When the power button **2012** is turned off, the air conditioner **1** is not supplied with the power and stops all operations. The air volume setting unit **2014** is intended to enable a user to set the air volume (e.g., rotational speed) of the first ventilation fan **122** of the air conditioner **1**. The first ventilation fan **122** is disposed between the first discharge port **104** and the evaporator **50**, and discharges cooled air around the evaporator **50** (or heated air when operated as the condenser) through the first discharge port **104**. The setting of the air volume may be divided into high/medium/low/very low, but it is not limited to such division. The setting of the air volume may be divided in a more simplified or complicated way, and be called another type of name.

The movement sensing unit **500** detects whether the air conditioner **1** falls while being operated or moving to another place, and informs the control unit **70** of the detected result in order to restrict the operation of the air conditioner **1**.

The control unit **70** controls overall operations of the air conditioner **1**. Especially, the control unit **70** controls the operating frequency of the compressor **20** such that the power input of the air conditioner **1** (or the power input of the compressor **20**) does not exceed a preset limit while maintaining the air volume set by the air volume setting unit **2014**. To this end, the control unit **70** secures data on the relation between the air volume and the operating frequency as shown in Tables 1 to 4 described above in a form of a lookup table, and controls the operating frequency of the compressor **20** which corresponds to the set air volume with reference to the secured data. A control method performed by such a control unit **70** will be described below with reference to FIG. **21**.

FIG. **21** is a view illustrating a first embodiment of a control method of the air conditioner according to an embodiment of the present disclosure. As illustrated in FIG. **21**, a user operates the power button **2012** to power on the air conditioner **1**, and thus the air conditioner **1** is initialized (S**2102**). After the initialization, when the user operates the air volume setting unit **2014** to set an air volume, the control unit **70** receives the setting of the air volume from the air volume setting unit **2014** (S**2104**).

The control unit **70** decides an operating frequency of the compressor **20** which corresponds to the set air volume (S**2106**). To this end, the control unit **70** decides the operating frequency of the compressor **20** which corresponds to the set air volume with reference to the lookup table representing the data on the relation between the air volume and the operating frequency as shown in Tables 1 to 4 described above. Here, the control unit **70** decides the operating frequency of the compressor **20** such that power input does not exceed a preset maximum value (e.g., 120 W) while maintaining the air volume set by the user. When the operating frequency of the compressor **20** is decided, the control unit **70** operates the compressor **20** at the decided operating frequency so as to enable cooling/heating.

When a change in the set air volume is received while the compressor **20** is operated at one operating frequency decided in this way ("Yes" of S**2114**), the process proceeds to S**2106**, and a new operating frequency of the compressor **20** which corresponds to a newly set (or changed) air volume is decided. In contrast, when a change in the set air volume is not received while the compressor **20** is operated at one operating frequency ("No" of S**2114**), it is checked whether or not to power off the air conditioner (S**2116**). When the air conditioner is not powered off ("No" of S**2116**), the compressor **20** continues to be operated at a current operating frequency (S**2108**).

When the air conditioner is powered off ("Yes" of S**2116**), the components that are in operation, such as the compressor **20**, the first ventilation fan **122**, and the second ventilation fan **222**, are stopped (S**2118**).

In this way, according to the control method of the air conditioner **1** according to an embodiment of the present disclosure, the compressor **20** is operated at the operating frequency corresponding to the set air volume. Thereby, the power input can be restricted to a preset value or less while the set air volume is maintained. This means that the power consumption amount of the air conditioner **1** is restricted to a desired value or less without changing the set air volume of the user, and thereby efficient power consumption control can be performed.

FIG. **22** is a view illustrating another control system of the air conditioner according to an embodiment of the present disclosure. As illustrated in FIG. **22**, AC power supplied from an AC power supply **2202** is converted into a DC by a DC power supply **2204**, and then is supplied to the air conditioner **1**. The DC power supply **2204** may be a DC adaptor acting as a separate device independent of the air conditioner **1**.

In the air conditioner **1**, a voltage distributing unit **2206** converts a voltage (e.g., 12 V or 24 V) output from the DC power supply **2204** into various voltages required from respective components of the air conditioner **1**, and supplies the converted voltages. For example, the compressor **20**, the first ventilation fan **122**, and the second ventilation fan **222** can be supplied with 12 V or 24 V with no change, but the control unit **70**, the input unit **2210**, and the movement sensing unit **500**, all of which require high voltage, can be supplied with 5 V or 3.3 V that is relatively low voltage.

The input unit **2210** may include a power button **2212** and an air volume setting unit **2214**. The power button **2212** is intended to enable a user to carry out on/off control of the air conditioner **1**. When the power button **2212** is turned on, the air conditioner **1** is initialized in an operable state while being supplied with the power. When the power button **2212** is turned off, the air conditioner **1** is not supplied with the power and stops all operations. The air volume setting unit **2214** is intended to enable a user to set the air volume (e.g., rotational speed) of the first ventilation fan **122** of the air conditioner **1**. The first ventilation fan **122** is disposed between the first discharge port **104** and the evaporator **50**, and discharges cooled air around the evaporator **50** (or heated air when operated as the condenser) through the first discharge port **104**. The setting of the air volume may be divided into high/medium/low/very low, but it is not limited to such division. The setting of the air volume may be divided in a more simplified or complicated way, and be called another type of name.

The movement sensing unit **500** detects whether the air conditioner **1** falls while being operated or moving to another place, and informs the control unit **70** of the detected result in order to restrict the operation of the air conditioner **1**.

A warning unit **2216** is intended to announce a warning when the power input of the compressor **20** or the total power input of the air conditioner **1** reaches a preset maximum limit so as to enable a user to recognize the fact. The warning unit **2216** may include at least one of a light-emitting device, a display device, and an acoustic device.

A compressor discharge temperature detecting unit **2218** is intended to detect a temperature of a discharge-side refrigerant of the compressor **20**. The compressor discharge temperature detecting unit **2218** may be a temperature sensor that is installed outside or inside a discharge-side pipe of the compressor **20** and detects the temperature of the refrigerant. Further, the compressor discharge temperature detecting unit **2218** may be a temperature sensor that detects a temperature at a place where the discharge temperature of the compressor **20** can be inferred.

The control unit **70** controls overall operations of the air conditioner **1**. Especially, the control unit **70** controls the operating frequency of the compressor **20** such that the power input of the air conditioner **1** (or the power input of the compressor **20**) does not exceed a preset limit while maintaining the air volume set by the air volume setting unit **2214**. To this end, the control unit **70** secures data on the relation between the air volume and the operating frequency as shown in Tables 1 to 4 described above in a form of a lookup table, and controls the operating frequency of the compressor **20** which corresponds to the set air volume with reference to the secured data. Further, the control unit **70** further reduces the operating frequency of the compressor **20** first when the power input of the compressor **20** exceeds the preset limit, thereby making an attempt so that the power input of the compressor **20** is reduced within the preset limit. Nevertheless, if the power input of the compressor **20** exceeds the preset limit to reach a maximum limit, a power overload of the air conditioner **1** is prevented by shutdown (e.g., power off). A control method performed by such a control unit **70** will be described below with reference to FIGS. **23** and **24**.

FIG. **23** is a view for describing a concept of power consumption control using a discharge temperature of the compressor in the air conditioner according to an embodiment of the present disclosure. FIG. **23**(A) is a graph illustrating a relation between a discharge temperature Tdis and a power input of the compressor, and FIG. **23**(B) is a graph illustrating a relation between the operating frequency and the discharge temperature Tdis of the compressor **20**.

In the air conditioner **1** according to an embodiment of the present disclosure, the power input of the compressor **20** is detected from a compressor discharge temperature Tdis based on the fact that the compressor discharge temperature Tdis is increased in proportion to an increase in the power input of the compressor **20**, and the operating frequency of the compressor **20** is controlled in consideration of the detected result. The reason the operating frequency of the compressor **20** is controlled in consideration of the compressor discharge temperature Tdis is as follows. When a user sets an air volume of the first ventilation fan **122**, the compressor **20** is operated at an operating frequency corresponding to the set air volume. In this state, if the first discharge port **104** through which the cooled/heated air is discharged by the first ventilation fan **122** is clogged with dust or obstacles, the cooled/heated air is not smoothly discharged. In this case, although the air volume set by the user is fixed, the actual air volume is likely to be reduced. When the actual air volume of the first ventilation fan **122** is reduced, the power input of the compressor **20** is increased. As such, power consumption is increased, and the compressor discharge temperature Tdis is also increased. Thus, the fact that the compressor discharge temperature Tdis is increased with the set air volume of the first ventilation fan **122** fixed means that the actual air volume of the first ventilation fan **122** is reduced due to an influence of the dust or the obstacles, and the power input of the compressor

20 is increased. As such, this is detected to control the operating frequency of the compressor **20**. Thereby, although the actual air volume of the first ventilation fan **122** is reduced, the power input of the compressor **20** is not excessively increased.

It can be found that, in FIGS. **23**(A) and **23**(B), the compressor discharge temperature Tdis is equal to or less than 82° C. in a section where the power input of the compressor **20** is equal to or less than 120 W. This section is referred to as a "steady" section. In the "steady" section, under the conclusion that the actual air volume of the first ventilation fan **122** is not reduced and is identical to the set air volume, the compressor **20** is operated at the operating frequency corresponding to the set air volume without changing the operating frequency of the compressor **20**.

It can be found that, in FIGS. **23**(A) and **23**(B), the compressor discharge temperature Tdis exceeds 82° C. and is not more than 85° C. in a section where the power input of the compressor **20** exceeds 120 W and is no more than 127 W. This section is referred to as an "adjustment" section. In the "adjustment" section, under the conclusion that the actual air volume of the first ventilation fan **122** is reduced,

the operating frequency of the compressor **20** is reduced to make an attempt so that the power input of the compressor **20** is reduced to fall within a range of 120 W or less. That is, the compressor exceeds the current target power input of 120 W, but the exceeding extent is not great. As such, an "adjustment" operation is performed to reduce the power input of the compressor **20** to a value less than 120 W by reducing the operating frequency of the compressor **20**.

In spite of the attempt of such "adjustment" in the FIGS. **23**(A) and **23**(B), if the power input of the compressor **20** exceeds 125 W, it is determined through the attempt to reduce (i.e. the adjustment of) the operating frequency of the compressor **20** that it is difficult to reduce the power input of the compressor **20** to 120 W or less. Therefore, in this case, an "interruption" operation that stops the operations of the compressor **20** and the first ventilation fan **122** to announce a warning is performed.

FIG. **24** is a view illustrating a second embodiment of a control method of the air conditioner according to an embodiment of the present disclosure. As illustrated in FIG. **24**, a user operates the power button **2012** to power on the air conditioner **1**, and thus the air conditioner **1** is initialized (S**2402**). After the initialization, when the user operates the air volume setting unit **2014** to set an air volume, the control unit **70** receives the setting of the air volume from the air volume setting unit **2014** (S**2404**).

The control unit **70** decides an operating frequency of the compressor **20** which corresponds to the set air volume (S**2406**). To this end, the control unit **70** decides the operating frequency of the compressor **20** which corresponds to the set air volume with reference to the lookup table representing the data on the relation between the air volume and the operating frequency as shown in Tables 1 to 4 described above. Here, the control unit **70** decides the operating frequency of the compressor **20** such that power input does not exceed a preset maximum value (e.g., 120 W) while maintaining the air volume set by the user. When the operating frequency of the compressor **20** is decided, the control unit **70** operates the compressor **20** at the decided operating frequency so as to enable cooling/heating (S**2408**).

The control unit **70** detects a discharge temperature Tdis of the compressor **20** using the compressor discharge temperature detecting unit **2218** while the compressor **20** is operated at one operating frequency decided in this way (S**2410**). If the detected compressor discharge temperature Tdis is a temperature within a "steady" range (Tdis=steady), the compressor **20** continues to be operated at a currently decided operating frequency (S**2412**). That is, in this case, although the compressor **20** is operated at a current operating frequency within a steady range (less than 120 W of FIG. **23**) within the power input of the compressor **20** is preset, no electrical overload occurs at the air conditioner **1**, and thus the compressor **20** continues to be operated at the current operating frequency.

When a change in the set air volume is received while the compressor **20** is operated at the current operating frequency in this way ("Yes" of S**2414**), the process proceeds to S**2406**, and a new operating frequency of the compressor **20** which corresponds to a newly set (or changed) air volume is decided. In contrast, when a change in the set air volume is not received while the compressor **20** is operated at one operating frequency ("No" of S**2414**), it is checked whether or not to power off the air conditioner (S**2416**). When the air conditioner is not powered off ("No" of S**2416**), the process proceeds to the discharge temperature detecting process (S**2410**) of the compressor **20**, and an operation corresponding to the discharge temperature of the compressor **20** is performed.

When the air conditioner is powered off ("Yes" of S**2416**), the components that are in operation, such as the compressor **20**, the first ventilation fan **122**, and the second ventilation fan **222**, are stopped (S**2418**).

In the discharge temperature detecting process (S**2410**) of the compressor **20**, when the detected compressor discharge temperature Tdis is a temperature within an "adjustment" range (Tdis=adjustment), the operating frequency of the compressor **20** is further reduced than the current operating frequency such that the power input of the compressor **20** is reduced (S**2422**). That is, in this case, the power input of the compressor **20** deviates from the preset steady range (less than 120 W of FIG. **23**). As such, if the compressor is operated with no change, an electrical overload occurs at the air conditioner **1**. Thus, the operating frequency of the compressor **20** is further reduced than the current operating frequency, and the power input of the compressor **20** is reduced. Thereby, the electrical overload is prevented from occurring at the air conditioner **1**.

In the discharge temperature detecting process (S**2410**) of the compressor **20**, when the detected compressor discharge temperature Tdis is a temperature within an "interruption" range (Tdis=interruption), the operations of the compressor **20**, the first ventilation fan **122**, and the second ventilation fan **222** are stopped (S**2432**), and a warning is given by the warning unit **2216** so as to enable a user to recognize the electrical overload state of the air conditioner **1** (S**2434**).

In this way, according to the control method of the air conditioner **1** according to an embodiment of the present disclosure, the compressor **20** is operated at the operating frequency corresponding to the set air volume. Thereby, the power input can be restricted to a preset value or less while the set air volume is maintained. This means that the power consumption amount of the air conditioner **1** is restricted to a desired value or less without changing the set air volume of the user, and thereby efficient power consumption control can be performed. Especially, it is detected through the discharge temperature of the compressor **20** in which of the "steady," "adjustment," and "interruption" states the power input of the compressor **20** is, and the operating frequency of the compressor **20** is controlled based on the detected result. Thereby, no electrical overload occurs at the air conditioner **1**, and the power input can be efficiently controlled.

The methods according to the above-described example embodiments may be recorded in non-transitory computer-readable media including program instructions to implement various operations embodied by a computer or processor. The media may also include, alone or in combination with the program instructions, data files, data structures, and the like. The program instructions recorded on the media may be those specially designed and constructed for the purposes of the example embodiments, or they may be of the kind well-known and available to those having skill in the computer software arts. Examples of non-transitory computer-readable media include magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD ROM discs and DVDs; magneto-optical media such as optical discs; and hardware devices that are specially configured to store and perform program instructions, such as read-only memory (ROM), random access memory (RAM), flash memory, and the like.

Examples of program instructions include both machine code, such as produced by a compiler, and files containing higher level code that may be executed by the computer using an interpreter. The described hardware devices may be configured to act as one or more software modules in order to perform the operations of the above-described embodiments, or vice versa. The described methods may be executed on a general purpose computer or processor or may be executed on a particular machine such as the air conditioner described herein.

The air conditioner of the present disclosure can be made small and easily installed by improving a structure of the heat exchanger.

Further, a positional change or movement of the air conditioner is possible as needed, the air conditioner has convenience as a portable device.

Further, a structure and disposition of the heat exchanger are improved to increase heat exchange efficiency, and a cooling mode and a dehumidifying mode can be operated.

In addition, when used for a personal purpose or in a local space, the air conditioner can be controlled to efficiently use power consumption.

Although specific embodiments of the present disclosure have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. An air conditioner comprising:

a housing including:

a first portion including a first suction port and a first discharge port,

a second portion including a second suction port and a second discharge port, and

a partition separating the first portion of the housing from the second portion of the housing;

a compressor disposed in the housing and configured to compress a refrigerant;

a condenser disposed in the second portion of the housing and configured to condense the refrigerant compressed by the compressor into a liquid phase;

an expansion tube configured to expand the refrigerant condensed by the condenser to a low pressure state;

an evaporator disposed in the first portion of the housing and configured to evaporate the refrigerant expanded by the expansion tube to exchange heat with ambient air;

a watertank configured to store a condensate; and

a tray assembly configured to discharge a condensate generated by the evaporator to the condenser and to discharge a condensate not evaporated by the condenser to the watertank, the tray assembly including:

a first tray having a water storage space configured to store the condensate generated from the evaporator,

a second tray configured to receive the condensate from the first tray and to discharge the received condensate to the condenser, and

a third tray disposed below the condenser and configured to collect condensate passing through the condenser.

2. The air conditioner according to claim **1**, wherein:

the first tray is disposed below the evaporator and includes an open water conduit configured to collect the condensate generated by a heat exchange between the evaporator and the air introduced from an outside;

the second tray is disposed above the condenser and includes a supply space configured to store the condensate delivered from the first tray; and

the third tray includes a discharge space configured to collect the condensate passing through the condenser.

3. The air conditioner according to claim **2**, further comprising an auxiliary member disposed between the second tray and the condenser and configured to uniformly supply the condensate discharged from the second tray to the condenser.

4. The air conditioner according to claim **3**, wherein the auxiliary member covers an upper portion of the condenser and is disposed between the condenser and the second tray under pressure and configured to uniformly disperse the condensate to the condenser.

5. The air conditioner according to claim **1**, further comprising a handle disposed on a line passing through a center of gravity of the air conditioner, wherein the condenser and the evaporator have a center of gravity disposed below the handle.

6. The air conditioner according to claim **1**, further comprising:

a first ventilation fan disposed in the first portion of the housing between the first discharge port and the evaporator; and

a second ventilation fan disposed in the second portion of the housing between the second discharge port and the condenser,

wherein the first discharge port, the first ventilation fan, the evaporator, and the first suction port are disposed in one row in the first portion of the housing, and

the second discharge port, the second ventilation fan, the condenser, and the second suction port are disposed in the second portion of the housing in another row parallel to the one row.

7. The air conditioner according to claim **1**, wherein the first discharge port and the second discharge port are disposed on opposing sides of the housing.

8. The air conditioner according to claim **1**, wherein:

the first portion of the housing includes an evaporation channel extending from the first suction port to the first discharge port;

the second portion of the housing includes a condensation channel extending from the second suction port to the second discharge port; and

the evaporation channel and the condensation channel extend in opposite directions from each other.

9. The air conditioner according to claim **1**, wherein the second portion of the housing is disposed below the first portion of the housing, and main surfaces of the condenser are not parallel to main surfaces of the evaporator.

10. The air conditioner according to claim **1**, further comprising a controller that is disposed in the second portion of the housing and configured to electrically control the air conditioner, wherein

the second portion of the housing includes a condensation channel extending from the second suction port, into which air is introduceable from an outside, to the second discharge port to which the air in the second portion of the housing is dischargeable, and

the condensation channel includes a first condensation channel that passes through the second suction port, the condenser, a ventilation fan, and the second discharge port, and a second condensation channel that passes through the second suction port, the controller, the ventilation fan, and the second discharge port.

11. An air conditioner comprising:

a housing comprising:

a first portion including a first suction port, a first discharge port, and an evaporator, and

a second portion including a second suction port, a second discharge port, and a condenser;

a partition configured to prevent air in the first portion of the housing from being interchanged with air in the second portion of the housing; and

a tray assembly including:

a first tray having a water storage space configured to store a condensate generated from the evaporator,

a second tray configured to receive the condensate from the first tray and to discharge the received condensate to the condenser, and

a third tray disposed below the condenser and configured to collect condensate passing through the condenser,

wherein the first portion of the housing includes components configured to discharge air cooled by the air conditioner to an indoor environment and the second portion of the housing includes other components configured to provide air from an outdoor environment to be cooled by the components included in the first portion of the housing.

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